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Involuntary Autobiographical Memories

An Introduction to the Unbidden Past

DORTHE BERNTSEN

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Involuntary Autobiographical Memories

We often remember personal experiences without any conscious effort. A piece of music heard on the radio may stir a memory of a moment from the past. Such occurrences are known as involuntary autobiographical memories. They often occur in response to environmental stimuli or aspects of current thought. Until recently, they were treated almost exclusively as a clinical phenomenon, as a sign of distress or a mark of trauma. In this innovative new work, however, Dorte Berntsen argues that involuntary memories are predominantly positive and far more common than previously believed. She argues that they reflect a basic mode of remembering that predates the more advanced strategic retrieval mode, and that their primary function may simply be to prevent us from living in the present. Reviewing a variety of cognitive, clinical, and aesthetic approaches, this monograph will be of immense interest to anyone seeking to better understand this misunderstood phenomenon.

DORTHE BERNTSEN is a Professor in the Department of Psychology at the Aarhus University.

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CAMBRIDGE
UNIVERSITY PRESS

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Cambridge, New York, Melbourne, Madrid, Cape Town, Singapore, São Paulo

Cambridge University Press

The Edinburgh Building, Cambridge CB2 8RU, UK

Published in the United States of America by Cambridge University Press, New York

www.cambridge.org

Information on this title: www.cambridge.org/9780521866163

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First published in print format 2009

ISBN-13 978-0-511-51786-0 eBook (NetLibrary)

ISBN-13 978-0-521-86616-3 hardback

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Preface

"You want everything finished before you have even started." I was trying to write a book, thinking about how to begin, when suddenly my grandmother's slightly irritated voice entered my memory. What I remembered was a common situation in my childhood, in which she tried to teach me how to knit or stitch. Frankly, I was never very good at either, and since I was impatient as well, my behavior often prompted this remark. Where did this memory come from and why at this particular moment? Was it because I was trying to plan my new book project in far too many details? I was trying to think it through to the end. So in a sense she was right. I wanted it finished before I had even started. No matter, I had not searched for the memory. The memory was involuntary. It came out of the blue and yet with a clear and unmistakable reference to my personal past. This book is about such involuntary memories.

My own way into this research topic was somewhat accidental. One might almost say involuntary, in the sense that it was not the result of a determined and rational decision. I had just finished my Master's degree in psychology and I wanted to apply for a Ph.D. scholarship. I had a long-standing interest in literature, notably poetic metaphors and how they are created. Yet my mentor thought that this would be too narrow for a Ph.D. in psychology. He encouraged me to think of something "clearly psychological," as he put it. I decided that autobiographical memory fulfilled that criterion, and I stumbled over a phenomenon that appeared to bridge my interest in literature with my interest in autobiographical memory. It was loosely described in many contexts and variously designated as spontaneous memories, unbidden memories, passive memories, intrusive memories, and involuntary memories. I chose the label *involuntary autobiographical memories*, because it seemed to be the one that best captured the

phenomenon and at the same time seemed relatively neutral with regard to theory.

Once you start paying attention to them, you will realize that involuntary autobiographical memories are common in daily life. Most of them deal with recent episodes. Others may bring back more remote experiences, as in the example just given. When I got interested in involuntary autobiographical memories, they had been observed and described by novelists and artists for a long time. Some of these artistic observations had found their way into psychology, notably the French author Marcel Proust's vivid and engaging descriptions. Memories that come unbidden had also been observed in clinical psychology and associated with a range of disorders, ranging from Posttraumatic Stress Disorder to near-death experiences. However, cognitive psychologists were essentially silent about them.

Now roughly fifteen years have passed. Several psychological studies of involuntary autobiographical memories have appeared in the literature. People studying this intriguing phenomenon are no longer "out in the woods" by themselves. We are now beginning to see the contours of a field. It is therefore a good time to review the work and attempt to integrate the findings, which is the purpose of this book.

I owe a lot of people thanks. My first acknowledgement goes to Steen Folke Larsen, who encouraged and supported my work until his tragic death in 1999. I thank the Memory and Cognition group, my present and former students and colleagues at the Department of Psychology at Aarhus University for their inspiration, help, and collaboration. Special thanks are due to my former student Nicoline M. Hall, for whom involuntary memories have been a long-standing interest and who conducted some of the first brain-imaging studies on this phenomenon and helped to move the field forward. Also many thanks to Annette Bohn, Malene K. Bohni, Lars Hem, Anne S. Jacobsen, Kim B. E. Johannessen, Peter Krøjgaard, Anne S. Rasmussen, Dorte K. Thomsen, and Yvonne Thomsen for collaboration and discussions. In particular, I thank Annette Bohn,

Anne Rasmussen, Kim Johannessen, and Carsten Rene Jørgensen for reading and commenting on some of the chapters.

My work over the years has benefited from discussions with many colleagues outside of Denmark. Specifically, I want to thank Chris T. Ball, Emily A. Holmes, John H. Mace, Lia Kvavilashvili, and Mark A. McDaniel. Parts of this book were written while I was a visitor at the Department of Psychological and Brain Sciences at Duke University. I thank people in the Memory at Duke (MAD) group for comments and inspiration, notably Peggy L. St. Jacques, Amanda N. Miles, Elizabeth J. Marsh, Jennifer M. Talarico, and Heather J. Rice. Finally, I thank David C. Rubin for reading and commenting on some of the chapters, for discussing ideas in relation to many others, and for being a continuous source of inspiration, depth, and warmth in my life.

1 Introduction to the unbidden past

It has been said that, in its haste to step into the twentieth century and to become a respectable science, Psychology skipped the preliminary descriptive stage that other natural sciences had gone through, and so was soon losing touch with natural phenomena.

(Tinbergen, 1963, p. 411)

Imagine that each time you wanted to remember a past experience you had to stop and make a clear decision and a commitment to remember. You would then move on and make a rough description, sketching what you wanted to remember. And once that was done, you would start looking for a memory fitting the description. Clearly, conscious recollections are sometimes the result of such explicit decisions and plans. We sometimes look for particular memories, and we sometimes succeed in finding what we are looking for. But imagine that this were the only possible way in which you could recollect your personal past. What a laborious and inflexible system that would be.

Fortunately, our memory is not just driven by conscious goals and commitments to remember. Often memories of past events come to mind in a manner that is completely unexpected and involuntary. They come with no preceding decision to remember, with no plans and no commitment. They may suddenly pop up in response to stimuli in our environment or aspects of our current thought. A piece of music accidentally heard on the radio may stir an image of a moment in the past that we feel we have not thought about for years, or at least not for a while. A random face in the street, the taste of a new brand of toothpaste, an email message on the computer screen, or encountering a familiar object at the bottom of the closet may serve as triggers for involuntary memories. Often

involuntary memories are hardly noted in the flow of daily experiences. Sometimes they may make us stop and contemplate for a moment, and maybe change our ongoing behavior. In more rare cases, involuntary memories may torment the individual by bringing to mind upsetting details of traumatic events, as observed in Post-traumatic Stress Disorder (PTSD) and other clinical disturbances (American Psychiatric Association, 2000). The possible content of involuntary autobiographical memories is diverse. Occasionally they are simply a surprising source of amusement during a dull task, as in the following example reported by a young female participant in one of my studies. The involuntary memory comes to her mind when she is on hold during a telephone conversation with the central administration at the university. It seems that this prolonged contact with the telephone receiver, forced upon her in the situation, enabled the activation of a childhood memory in which a telephone receiver also played a key role:

I remember the first telephone we had in my childhood. It was placed on the bookshelves in the living room. My sister and I were racing one another to answer it when it eventually rang. One day my sister reached the phone first and yelled, short of breath, into the receiver: "It's Vera!" (that was my name – her name was Louise).

This book is about such involuntary autobiographical memories – operationally defined as memories that come to mind with no preceding conscious attempt at retrieval. They are contrasted with voluntary memories, which are memories that are called to mind in a strategic and goal-directed fashion. These operational definitions do not imply that "free will" is a causal factor for voluntary but not for involuntary memories. Invoking free will as an explanation for mental phenomena is a risky endeavor, because we generally do not have very good access to what causes our behavior (e.g., Wegner, 2002). For example, most researchers agree that we have little awareness of the processes underlying successful retrieval. In the

present context, the notion of involuntary memories therefore refers to memories that are *subjectively* experienced as unintended, whereas their voluntary counterpart is memories that are subjectively experienced as intended.

Involuntary autobiographical memories were for a long time neglected in cognitive psychology, whereas they attracted interest in clinical psychology in relation to specific disorders such as PTSD (a point to be elaborated in Chapters 2 and 7). Most cognitive psychologists seem to have worked under the assumption that memories are called to mind as the result of a conscious decision and plan to do so. In this view, involuntary autobiographical memories are an exception to the standard and might most appropriately be viewed as a curiosity. As I will point out later in this chapter, there are good historical reasons why this view has been pervasive in cognitive psychology. Nonetheless, I shall argue that it is wrong. The evidence instead suggests that involuntary remembering is a basic mode of remembering the personal past.

During the last ten to fifteen years, an increasing amount of research has been conducted on involuntary autobiographical memories. Maybe one of the most important findings from this research is that involuntary autobiographical memories are pervasive in daily life. For example, in a recent study (Rubin and Berntsen, 2008) we found that people rated the frequency of involuntary memories in relation to a particular event roughly as high as they rated how often they had voluntarily brought the same event to mind. Findings from diary studies indicate that most people have several involuntary autobiographical memories per day (Berntsen, 1996, 2007).

Since involuntary autobiographical memories are common it is reasonable to ask why we have them. I shall argue in this book that involuntary autobiographical memories may be an evolutionary forerunner of voluntary autobiographical memory. Consistent with this view, I review evidence suggesting that involuntary memories are largely similar to their voluntary counterparts on basic factors determining encoding and maintenance, but differ on mechanisms

related to retrieval in that involuntary memories depend on associative mechanisms whereas voluntary memories reflect a top-down schema-driven search process. I shall also argue that although involuntary autobiographical memories may sometimes seem to disturb us, we are generally lucky to have them. If we did not, if remembering the personal past was always contingent upon decisions, plans, and effortful searches, we would probably live much more in the present than we actually do. This would be harmful to our survival both as individuals and as a species. Both voluntary and involuntary memories of the past play an important role for planning ahead. As many theorists have pointed out, we consult memories of past experiences when we envision possible future events (e.g., Addis, Wong, and Schacter, 2007; Miller, 1962; Suddendorf and Corballis, 2007). Having involuntary autobiographical memories helps to keep our temporal horizon wide. Through such memories, past events are rehearsed and maintained with little cognitive effort. Involuntary memories automatically make us aware of the fact that our life extends way back into the past and probably a great distance into the future as well. They tap us on the shoulder and remind us that we should adjust our present behavior accordingly.

Our remarkable ability to recollect the personal past and foresee possible future events gives humans a great advantage compared to other species. Although other species clearly learn from experience, the time range over which their learning spans is substantially shorter than what can be observed in humans (Roberts, 2002). Despite the fact that some of us may think that it is important to live “here and now,” being stuck in the present is a clear disadvantage from an evolutionary point of view. Involuntary memories automatically take us out of the present. They are therefore an important and basic mechanism of mental life.

Consistent with this view, Hermann Ebbinghaus (1885) described involuntary conscious memories as a basic form of remembering when he launched experimental research on human memory in the world’s first book on this topic. However, some eighty

years later, in 1962, another famous cognitive psychologist, George Miller, dismissed the topic as “the complete antithesis of all we have learned to call scientific” (1962, p. 180). How can two such opposing views exist in the same field? Let us begin our journey into the unbidden past with a quick glance at its history in cognitive psychology.

THE FORGOTTEN MEMORIES

Hermann Ebbinghaus (1885) opened his ground-breaking book on experimental studies on memory with a distinction between three basic modes of memory: a voluntary mode, an involuntary mode, and a non-conscious mode. He described involuntary memories as occurring when “mental states once present in consciousness return to it with apparent spontaneity and without any act of the will” (p. 2). This was opposed to voluntary memories, described as when “we call back into consciousness by an exertion of the will directed to this purpose the seemingly lost states” (p. 1). Further, voluntary and involuntary memory were distinguished from non-conscious memory, which he described as when “the vanished mental states give indubitable proof to their continuing existence even if they themselves do not return to consciousness at all” (p. 2).

One advantage of Ebbinghaus’s taxonomy is that he distinguished between conscious versus non-conscious awareness and intentional versus unintentional retrieval, which allows a category of memories that are unintentional and conscious – that is, involuntary conscious memories (see Table 1.1). This category is overlooked in definitions equating conscious recollection with intentional retrieval. This applies to the way the contradistinction between implicit and explicit memory has been defined by some implicit memory researchers, namely as a distinction between unintentional and intentional retrieval (Schacter, Bowers, and Booker, 1989). Schacter *et al.*’s definition was a revision of the original implicit memory definition – i.e., the facilitation of the performance of a certain task by an earlier experience in the absence of conscious

Table 1.1. *A taxonomy of memory: conscious vs. non-conscious memory by intentional vs. unintentional retrieval*

Retrieval	Memory awareness	
	Conscious	Non-conscious
Intentional	Voluntary memories	–
Unintentional	Involuntary memories	Implicit memory

recollection of this experience (Schacter, 1987). However, many scholars considered the original implicit memory definition as problematic, because it is not clear whether the notion of conscious recollection should refer to intentional retrieval or to phenomenological awareness of the study episode (e.g., Kinoshita, 2001; Richardson-Klavehn, Gardiner, and Java, 1994; Schacter *et al.*, 1989). To clarify, Schacter *et al.* (1989) thus recommended a distinction in terms of retrieval intentionality rather than in terms of conscious awareness, partly because the intentionality criterion seems easier to control. Nonetheless, the consequence of equating conscious memory with intentional retrieval and unconscious memory with unintentional retrieval is of course that the important distinction between involuntary *conscious* and involuntary *unconscious* memories is lost. As a result, involuntary – but nonetheless conscious – memories are overlooked (e.g., Kinoshita, 2001; Richardson-Klavehn *et al.*, 1994). An advantage of Ebbinghaus’s taxonomy is that it does not confound these two forms of unintended memory.

Ebbinghaus (1885) explained involuntary conscious memories as a product of association. This agrees very well with modern cognitive explanations of the phenomenon. As we shall see later in this book, encoding specificity – which implies association via contiguity – is one of the most frequently invoked explanations for involuntary memories among modern memory researchers. In 1885 Ebbinghaus observed:

As more exact observation teaches us, the occurrence of these involuntary reproductions is not an entirely random or accidental one. On the contrary they are brought about through the instrumentality of other, immediately present mental images. Moreover they occur in certain regular ways which in general terms are described under the so-called “laws of association” (p. 2).

Ebbinghaus’s reliance on associations agreed very well with the spirit of his time, which was characterized by a strong tradition of regarding associations as the basic building blocks of the mind. Laws of association were central in theories about thought and memory during the Enlightenment. They were discussed by several philosophers of mind, such as René Descartes, Thomas Hobbes, John Locke, George Berkeley, and David Hume, and considered as the elementary means for connecting sensory impressions or “ideas” (see Warren, 1916, for a review). Also, in the Wundtian school of psychology – contemporary with Ebbinghaus – isolated sensory data were assumed to compose coherent percepts by mechanisms of association (Rapaport, 1967).

The emphasis on association as the basic regulator of behavior continued through the behaviorist era, but changed with the cognitive renaissance in the 1960s. With the new cognitive paradigm and its analogy with the computer, the basic structure of behavior was no longer taken to be strings of associations or reflexes, but the feedback loop (Miller, Galanter, and Pribram, 1960; Wiener, 1948). Briefly, feedback models assume that the organism controls its own behavior by comparing its current state against a goal state and by acting so that the difference between the current and the goal state is reduced and eventually abolished (i.e., the goal state is reached). The cybernetic idea of the feedback loop as an organizer of mental life and its inherent connection to rules and plans is probably our best key to understanding why cognitive psychology for a long time neglected involuntary conscious memories.

A good example of the central role played by the feedback loop is Miller *et al.*’s (1960) theory of the organization of behavior. Their

model was intended to explain a range of problem-solving activities, including retrieval from long-term memory. They exemplified their model with the rather simple activity of hammering a nail into the wall. The conception of the feedback loop as described in their model involved three components: (1) a plan specifying a desired outcome; (2) a test phase; and (3) an operation phase. In the test phase, the current state of the problem-solving attempt is compared to a representation of the desired outcome. In the case of incongruity, the organism moves on to the operation phase (e.g., hammering), which is then followed by a test phase (e.g., checking how far the nail has gone into the wall). If incongruity is still identified, the operation is resumed. Thus, a negative feedback causes the operation to be repeated until congruity between the test and the desired outcome is eventually achieved. The feedback loop renders the organism (or computer) capable of structuring and controlling its own behavior.

Similar feedback models have been employed in theories of memory retrieval. In Norman and Bobrow's (1979) model of retrieval from long-term memory, retrieval begins with a specification of the information that is being sought. The specification consists of a target description and verification criteria. The second step is a matching process in which candidate records are accessed and selected. In the third phase, the selected records are then evaluated against the verification criteria. The third phase can be seen as corresponding to the test phase in Miller *et al.*'s (1960) feedback model. If the evaluation is negative, the retrieval process is continued (which may involve a reformulation of the search criteria). If it is positive, the retrieval process is terminated.

There are other accounts of retrieval based on feedback models, such as Conway and Pleydell-Pearce's (2000) recent notion of generative retrieval from autobiographical memory or Morton, Hammersley, and Bekerian's (1985) headed records model. The models differ on details and also on whether they are presented as exhaustive explanations or supplemented by descriptions of other kinds of retrieval. However, in the present context, the point is simply that

such feedback models describe retrieval as a goal-directed search beginning with a conscious specification of the material to be brought forward. They therefore depict retrieval as a self-initiated, voluntary process. As Neisser (1967) concluded, “in this sense remembering is always a form of problem-solving, and therefore a higher mental process” (p. 294).

Furthermore, instead of the passive encoding and reactivation of memory traces that may be implied by the notion of association, cognitive psychologists emphasized the constructive nature of both encoding and retrieval. As argued by Neisser (1967), “stored information is not revived, but simply used, in the constructive activity of recall” (p. 289). He argued against what he called the “Reappearance Hypothesis” (p. 281), referring to the idea that information is stored in a permanent form from which it can be passively activated.

Indeed, involuntary conscious memories have sometimes been described and even named as *passive remembering* (Spence, 1988). This label seems to imply the idea of a passive reactivation of memory traces. Probably the most frequently cited example of this view is the French author Marcel Proust’s (1928) description of how the taste of a *petite madeleine* dipped in tea suddenly evoked a long-forgotten and very detailed childhood memory. Proust described several instances of involuntary memories (to be discussed in Chapter 6 of this book). In his account, they seem to be passive activations of very detailed memories that may be almost exact copies of past experiences. Clearly, such a view of memory is counter to the cognitivist emphasis on goal-directed retrieval and active reconstructions of the past.

Even though cognitive psychology at its outset rebelled against the associationist approach and instead emphasized the active and constructive nature of the mind, both George Miller and Ulrich Neisser nonetheless acknowledged the existence of involuntary autobiographical memories. In his now classic textbook *Psychology: The science of mental life*, Miller (1962) opens his chapter on memory by quoting Proust. Miller comments:

Proust's little cake set off a psychological accident, so unique, personal, unexpected, and unexplained as to seem the complete antithesis of all we have learned to call scientific. The contrast does not concern the truth of Proust's account – one can grant that there is a sense in which this is true even though it may never have occurred. The contrast is in his method of displaying the truth. Consider the difficulties that would face any scientist who wanted to study such mental phenomena. His first difficulty would be that he has no way to capture the thing he wishes to study. He can only sit and wait, hoping for the improbable (p. 180).

Neisser (1967) too acknowledged the existence of involuntary memories and similar uncontrolled mental phenomena. And in contrast to Miller (1962), he even encouraged cognitive psychologists to study such involuntary mental occurrences. As he pointed out: "It would be pointless to develop a theory of thought and memory that had no room for these phenomena" (p. 299). As he observed, thought is not always goal-directed:

Thought is by no means always coordinated toward a particular goal. We are not forever engaged in "filling up gaps in the evidence" (Bartlett, 1958, p. 20), nor in following out some strategic plan. It is true that I may construct an image in the course of directed train of thought, but more often the image just "comes by itself" (p. 297).

In short, cognitive psychologists did not deny the fact that there was more to the mind than consciously initiated processes governed by rules and plans. For a long time, however, they decided to concentrate on the latter and turn a blind eye to involuntary conscious remembering.

DAYDREAMING AND THE STREAM OF CONSCIOUSNESS

A very different focus was taken by another approach that was also launched in the 1960s, namely research on daydreaming (Singer,

1966). Daydreaming research had its roots in a psychodynamic view of the mind (see Chapter 2), but was theoretically and methodologically influenced by the contemporary cognitive approach. In contrast to mainstream cognitive psychology, researchers on daydreaming attempted to study the uncontrolled and spontaneous aspects of mental life. In this regard, an important source of inspiration was William James's theoretical elaborations on the notion of consciousness. In daydreaming research, the behaviorist confidence in reflexes (or associations) and the cognitivist appeal to the feedback loop were replaced by the *stream of consciousness* – a metaphor that derived from James (1890, 1892).

By describing consciousness as a stream, James (1892) distanced himself from the analytical introspection that characterized experimental psychology at the time. The goal of analytical introspection in the Wundtian school of psychology was to identify the elementary units from which complex states of consciousness were assumed to be built. James argued instead that the study of mental life should begin with concrete phenomena that were part of daily experience. In this regard, he observed:

The first and foremost concrete fact which everyone will affirm to belong to his inner experience is the fact that *consciousness of some sort goes on*. “*States of mind*” *succeed each other in him*. If we could say in English “it thinks”, as we say “it rains” or “it blows”, we should be stating the fact most simply and with the minimum of assumption. As we cannot, we must simply say that *thought goes on*. (James, 1892, p. 152)

James (1892) identified four central characteristics of consciousness. First, consciousness is personal in the sense that each person has access only to his or her own stream of consciousness. The stream metaphor thereby implies a dualism between an objective external world and an inner world that is accessible only for the individual in question and thus essentially subjective. As we shall see shortly, this dualism is important in the daydreaming literature.

Second, the stream is constantly changing. No conscious state can be identical to a previous conscious state. This position goes against the idea of passive reactivation of unchangeable memory traces, since a memory – or any other conscious state – cannot be a copy of a previous conscious state. As I pointed out earlier in this chapter, Neisser (1967) took a similar stand in his critique of the “Reappearance Hypothesis.” Third, consciousness is continuous. It does not appear to the individual to come in unconnected bits and pieces. Each part is connected to its preceding and succeeding parts. The self is assumed to be an important source for this sense of continuity. Fourth, consciousness is selective. It focuses on one topic of thought at the expense of others.

How do these ideas relate to the notion of daydreaming introduced roughly seventy years later? Essentially, daydreaming research was an attempt to study the flow of conscious mental life as it unfolds more or less spontaneously in daily life. Research on daydreaming was therefore not limited to certain types of mental contents, such as fantasies about personal events in the future. It could also involve memories of past events, fantasies about other people’s lives, or even thinking about unresolved problems. This broadness in content – and the allusion to James’s stream of consciousness – is illustrated by the following extract from Singer (1966, p. 3):

The inner processes usually considered are “pictures in the mind’s eye,” the unrolling of a sequence of events, memories or creatively constructed images of future events of various degrees of probability of occurrence. Also, included as objects of daydreaming are introspective awareness of bodily sensations, affects or *monologues intérieurs*.

Thus, daydreaming is not a particular kind of mental content (e.g., wishful fantasies about the future) nor is it defined in terms of a certain quality (e.g., being uncontrollable). Although daydreaming may sometimes consist of involuntary and far-fetched fantasies, it can deal also with much more realistic concerns and may even be

generated in a goal-directed fashion (Singer, 1966). The definition of daydreaming used by Singer (1966) is simply a shift in attention away from an ongoing task (and external stimuli) towards internal sources of stimuli.

A similar definition is found in later, closely related concepts. The notion of task-unrelated thought grew out of daydreaming research and is used as an operational definition of daydreaming activity during vigilance tasks (e.g., Giambra, 1989). Mind wandering (e.g., Smallwood and Schooler, 2006) is a recent variant of the same class of concepts, defined as “a situation in which executive control shifts away from a primary task to the processing of personal goals” (p. 946). Thus, mind wandering is essentially synonymous with task-unrelated thought and daydreaming. All three notions deal with processes that are internally generated and all three notions are contrasted with processes that are initiated and maintained in response to demands from the external world. It has been demonstrated in multiple experiments that daydreaming (or task-unrelated thought or mind wandering) increases as the demands of the environment diminish. The stream of consciousness metaphor is often invoked to explain the source of these internal stimuli that seem to take over when the external environment reduces its demands on the individual. For example, Singer (1966, p. 6) wrote:

Can we ascertain whether all persons have a continuous stream of thought to which they attend only when external cues are reduced, as in relaxation, sleep or in the quiet of a psychoanalyst’s office?

The stream of thought metaphor implies that the mind is spontaneously active, that it is spontaneously producing its own mental content. “It thinks,” as James (1892) stated in the extract quoted above. It is somewhat puzzling how the mind can be active and creative in the absence of external stimulation. What is really astonishing about this spontaneous mental activity is that its products are appreciated as meaningful by the self. The mind is not

rambling wildly and pumping out random bits and pieces of thoughts and sensory impressions. Instead, the content of the stream is *meaningful*. It refers to entities and events in the world and represents their relation to other entities and events in meaningful ways. The stream of thought can therefore be considered as a stream of symbolic activity. How is this possible? Is the human mind spontaneously generating symbolic representations? This was precisely the point of Langer's (1951) groundbreaking book *Philosophy in a new key*, in which she argued that what distinguishes humans from other animals is the ability, indeed the urge, to transform sensory experiences into symbolic representations. In Langer's (1951) account, symbolization is a basic and spontaneous mental activity that goes on in the absence of conscious awareness and executive control. This agrees well with James's (1890, 1892) notion of the stream of consciousness and Singer's (1966) notion of daydreaming. Indeed, Langer herself used a stream metaphor to describe her central point (p. 34, emphasis added):

The current of experience that passes through it undergoes a change of character, not through the agency of the sense by which the perception entered, but by virtue of a primary use which is made of it immediately: *it is sucked into the stream of symbols which constitutes the human mind.*

. . . The fact that the human brain is constantly carrying on a process of symbolic transformation of the experiential data that come to it causes it to be *a veritable fountain of more or less spontaneous ideas.*

Findings in cognitive neuroscience support the view that the mind spontaneously produces meaningful mental representations, and that this spontaneous cognitive activity is most clearly observed when few external demands are posed, such as when we are resting or faced with a boring, monotonous task. Mazoyer *et al.* (2001) compared brain activity in a resting state (subjects were in darkness and silence) against brain activity while solving a wide range of cognitive

tasks. The researchers identified a network of brain areas that were more active during the resting condition than during the cognitive tasks. Several studies have replicated these findings, and the network of brain areas that are especially active during rest has been labelled *the default network* (e.g., Mason *et al.*, 2007). The assumption is that this network is responsible for the production of spontaneous mental activity as observed in daydreaming, and that this is a “baseline from which people depart when attention is required elsewhere and to which they return when tasks no longer require conscious supervision” (p. 393). This definition is almost equivalent to the definition of daydreaming given by Singer (1966, see quotation above). A recent study has provided direct evidence that increased activity in the default network correlates with daydreaming activity, and that individuals with a greater propensity for daydreaming have more activation in the default network during resting states (e.g., Mason *et al.*, 2007). The default network in cognitive neuroscience can be considered as a modern stream of thought metaphor, although the connection to James is often lost.

THIS BOOK

This book is not about all kinds of involuntary conscious memories. People have involuntary conscious memories that are not autobiographical, such as involuntary musical imagery – e.g., having a “tune on the brain” (Bailes, 2007) – or random words or sentences popping into mind (Kvavilashvili and Mandler, 2004). Although such phenomena are highly interesting and warrant scientific studies, they are beyond the scope of this book. The same is the case for hallucinations, confabulations, or similar phenomena in which the involuntary mental contents overrule reality more or less completely. Another possibly related notion is prospective memory – defined as “memory for actions to be performed in the future such as remembering to give a message to a friend or remembering to take medication” (Einstein *et al.*, 2005, p. 327). Even though prospective memory may involve involuntary memory mechanisms (Einstein

et al., 2005; Kvavilashvili and Fisher, 2007), it is conceptually distinct from autobiographical memory.

Here, I limit myself to involuntary conscious memories that are autobiographical. Conceptually, autobiographical memory has exactly the same referent as episodic memory – namely memories for personal experiences that are accompanied by a feeling of reliving the event at the time of recall. I therefore use the notions of autobiographical and episodic memory as synonyms, consistent with Tulving (1983). Autobiographical (or episodic) memory involves mental time travel, which is the ability to mentally project oneself back and forth in time. It involves a self-reflective awareness (called *autonoetic awareness*) that enables the person to identify the remembered event as belonging to his or her personal past and to relive it in consciousness (e.g., Tulving, 2002; Wheeler, Stuss, and Tulving, 1997). We know from autobiographical memory research that visual imagery is dominant in autobiographical memories and that it generally is the best predictor for how strongly people feel they are reliving the remembered event (Brewer, 1996; Rubin, 2006; Rubin, Schrauf, and Greenberg, 2003), whereas our belief that the event actually took place in our past is more closely associated with how well we remember the setting for the event (Rubin *et al.*, 2003). Although most research has focused on memories of past events, mental time travel also includes an ability to project oneself into the personal future and consciously “prelive” possible future events (a topic I address in some detail in Chapter 8).

In Chapter 2, I first describe my own theory of involuntary autobiographical memories and how they differ from voluntary autobiographical memories. I next review psychodynamic, cognitive, and aesthetic theories of involuntary autobiographical memories. Chapter 3 addresses how something as uncontrollable and unpredictable as involuntary autobiographical memories can be studied in systematic ways. I describe the structured diary method, which is so far the most commonly used method for sampling involuntary memories. I also describe some recent attempts at moving

involuntary autobiographical memories into the lab. To illustrate some of the methodological and theoretical issues that meet researchers of involuntary memories, I describe observations from an early pilot study. Chapter 4 reviews a number of findings showing that involuntary and voluntary memories are strikingly similar with regard to factors that are known to support encoding and maintenance, such as event age, rehearsal, and emotion. This supports the view that the two forms of memory are sampled from the same episodic memory system and only differ from one another with regard to the way they are retrieved. Chapter 5 addresses how involuntary autobiographical memories come to mind. I review findings showing that most of them come to mind in response to features in the environment or thought that match parts of the memory content and thus work as cues for the memory. I also review some evidence suggesting that motivational factors, such as current concerns (Klinger, 1978), may affect which memories are brought to mind, and I delineate a possible interplay between associative and motivational factors. I finally discuss why we are not constantly flooded by involuntary memories. Chapter 6 addresses differences between involuntary and voluntary autobiographical memories with respect to their phenomenal characteristics. I argue that these differences can be explained as a result of the dissimilar retrieval processes that led to the construction of the two forms of memories. More specifically, I argue that differences regarding mechanisms of retrieval can explain why involuntary memories are usually more specific and distinctive and involve more mood impact and emotional reaction than voluntary memories. I relate these findings to Marcel Proust's aesthetic observations on the distinct quality of involuntary memories. Chapter 7 discusses clinical theories of involuntary memories of traumatic events, such as in PTSD. I argue that intrusive memories and flashback in PTSD can be explained in terms of the same mechanisms that characterize involuntary autobiographical memories in general – in other words, that no trauma-specific memory mechanisms may be needed. In Chapter 8,

I introduce a new field of research: involuntary future mental time travel. This refers to the ability to involuntarily project oneself into the personal future to envision and prelive possible events. I describe findings from a recent research project showing that involuntary future mental time travel seems to be at least as common as involuntary autobiographical memories, and that involuntary memories and involuntary future event representations differ from their voluntary counterparts in quite similar ways. I finally discuss the implications our knowledge about involuntary autobiographical memories (and involuntary future event representations) may have for our theoretical understanding of autobiographical memory in a broader sense. Albeit speculatively, I shall argue that the involuntary form of this memory system is an evolutionary forerunner of the voluntary form and is unlikely to be specific to humans.

2 Theoretical backgrounds

Historically, psychology has long recognized the existence of two different forms of mental organization. The distinction has been given many names “rational” vs. “intuitive,” “constrained” vs. “creative,” “logical” vs. “prelogical,” “realistic” vs. “autistic,” “secondary process” vs. “primary process” . . . a common thread runs through all the dichotomies. Some thinking and remembering is deliberate, efficient and obviously goal-directed; it is usually experienced as self-controlled as well. Other mental activity is rich, chaotic and inefficient; it tends to be experienced as involuntary, it just “happens.”

(Neisser, 1967, p. 297)

Involuntary autobiographical memories belong to a class of mental phenomena that enter consciousness in an uncontrolled fashion and thus in ways that may appear to be inexplicable and maybe even mystifying to the individual. For example, a former colleague reported that he was often reminded of a particular school friend when he ate cheese with caraway seeds (which he rarely did). Not being able to detect any connection between this person and cheese with caraway seeds, he turned to “the expert” for an explanation. Unfortunately, I could not provide one that he felt was completely satisfying. Nonetheless, in what follows, I will try to provide an overall theory of involuntary autobiographical memories that has the potentials of accounting for most individual cases (although it may be possible for the reader to come up with personal observations and anecdotes that it seems to miss).

A theory of involuntary autobiographical memories should attempt to give a general answer to at least the following questions: How do involuntary autobiographical memories come to mind? How do they differ from voluntary memories? How do they become dysfunctional, as in PTSD? Each of these questions brings about many other questions at more detailed levels of analysis. We shall pursue these questions throughout the remaining parts of this book.

Previous theoretical accounts of involuntary autobiographical memories have tended to develop within isolated approaches, each addressing subsets of the overall phenomenon (e.g., involuntary memories with a traumatic content) and ignoring others. For that reason, no previous approach has attempted to address all of these questions within a coherent theory, although some integrative accounts have recently been introduced addressing parts of these issues (e.g., Baars, Ramamurthy, and Franklin, 2007; Berntsen, 2007). My aim is to develop such an overall theory and evaluate it in relation to recent findings on involuntary autobiographical memories. Further, I base this theory on our general knowledge of memory instead of invoking special mechanisms that pertain only to the phenomenon at hand, such as hypothetical memory mechanisms or systems that deal only with involuntary memories. In the present chapter, I will first outline my theoretical approach. I will then describe and discuss previous accounts of involuntary memories as they have developed within fundamentally different approaches. This historical review includes psychodynamic theories, cognitive theories, and aesthetic theories of involuntary autobiographical memories.

AN EPISODIC MEMORY THEORY OF INVOLUNTARY AUTOBIOGRAPHICAL MEMORIES

Involuntary autobiographical memories are manifestations of the episodic memory system as this system has been conceptualized by Endel Tulving and his colleagues (see Tulving, 2002; Wheeler *et al.*, 1997, for reviews). As mentioned in Chapter 1, I use the term episodic memory synonymously with autobiographical memory, consistent with Tulving (1983). Although some of the current views of episodic memory may need modification in order to account for autobiographical recollections coming to mind involuntarily and thus outside retrieval mode (i.e., with no conscious search, Tulving, 1983), the notion of episodic memory nonetheless provides a very relevant starting point for a theory of involuntary autobiographical memories. Episodic memory is considered to be a distinct

neurocognitive system that enables people to mentally travel back in time and consciously relive past events in consciousness – a state called *autonoetic awareness*. The ability to mentally time travel also involves an ability to project oneself forward in time and envision anticipated personal events in the future (Wheeler *et al.*, 1997). Recent evidence shows that memories of past events and images of anticipated future events have highly similar phenomenological characteristics and to a great extent are supported by the same brain structures (e.g., Addis *et al.*, 2007; Okuda *et al.*, 2001; Szpunar, Watson, and McDermott, 2007).

What does it mean to say that involuntary and voluntary autobiographical memories are manifestations of the same episodic memory system when at the same time they can be regarded as quite different types of autobiographical memories? First, one important implication is that the same basic encoding and maintenance factors operate in both types of memory. For example, recency and emotional arousal at the time of encoding will enhance memory for both types of recall. I review the evidence for this claim in Chapter 4. Second, the main differences between involuntary and voluntary autobiographical memories concern how they are activated from the episodic memory system at the time of retrieval. Both types of retrieval can be accounted for through well-known mechanisms of episodic memory recall. Voluntary memories are activated through a cyclic search process that is initiated and monitored by a conscious search description – the latter being generated from the person's overall generic knowledge, such as his or her self-schemata and life story. Involuntary memories, on the other hand, come to mind with no initiating conscious search and search description. Their occurrence is due to associative processes. Two factors operating together enable episodic memories to be specified by associative processes. One is an encoding retrieval match – that is, the memory comes to mind in response to a cue in the environment or thought that was also present at the time of encoding. This refers to the encoding specificity principle (Tulving and Thomson, 1973), which is often

invoked in cognitive accounts of involuntary autobiographical memories. However, although this principle is important, it leaves many problems unresolved (e.g., Nairne, 2002). One pertinent problem is cue overload: in cases where a cue matches several past events, how is one elicited over others? In order to answer this question, we have to consider factors that increase the so-called cue-item discriminability defined as “how easily a given cue isolates an item” (Rubin, 1995, p. 151). Rubin (1995) has shown the usefulness of cue-item discriminability for explaining memory in oral traditions. In Chapters 5 and 6, I will discuss and specify cue-item discriminability in relation to the activation of involuntary autobiographical memories.

Third, differences between involuntary and voluntary autobiographical memories regarding content and qualities should be explained in terms of differences related to their retrieval. Because involuntary memories are due to associative processes rather than top-down search processes they are generally more specific (less generic) and may appear as more novel and more emotionally engaging than their voluntary counterparts – a point that is often emphasized in aesthetic accounts. I review evidence in support of these ideas in Chapter 6.

Fourth, the present theory is able to account for recurrent involuntary memories of traumatic events – as described in the clinical diagnosis of PTSD (American Psychiatric Association, 2000). I will argue that such memories do not need special mechanisms, contrary to what is frequently assumed in the trauma literature. In the present account, recurrent involuntary memories of traumatic events may reflect an increased accessibility of the traumatic event as a result of its emotion, distinctiveness, life impact, etc. Cues that under other circumstances would activate a range of different events may repeatedly activate the trauma. This issue will be discussed in Chapter 7.

Fifth, in Tulving’s (2002) definition, “episodic memory is a neurocognitive (mind/brain) system, uniquely different from other memory systems, that enables human beings to remember past

experiences" (p. 1). Phrased in these terms, the present theory implies that involuntary and voluntary autobiographical memories differ with regard to the neurocognitive mechanisms involved in strategic versus non-strategic retrieval, whereas they do not differ regarding the neurocognitive mechanisms involved in encoding. Because the hippocampus and surrounding areas are taken to be necessary for binding information into events and thus for encoding episodic memories (see Rubin, 2006, for a review), we would assume such neural areas to be crucial to both involuntary and voluntary episodic memories. Thus, a person with severe damage to the medial temporal lobes would have neither voluntary nor involuntary autobiographical memories. Because areas in the frontal lobes are crucial to a selective and strategic search process (Rubin, 2006), damage in such frontal areas would lead to severely reduced voluntary memories, but would not to the same extent affect the ability to have involuntary autobiographical memories. Unfortunately, very little work has been conducted on involuntary conscious memories in brain-damaged people. However, preliminary observations suggest that demented individuals who are unable to strategically recall events from the personal past may nonetheless at times be able to spontaneously experience involuntary autobiographical memories when stimulated by relevant sensory cues (Kryger, Lindberg, and Mathiassen, 2005). Also, although very few brain imaging studies have been conducted on involuntary episodic memories, the evidence so far supports the view that involuntary memories are associated with activity in the hippocampus and surrounding areas and to a lesser extent involves activity in the prefrontal areas when contrasted with strategically retrieved memories (Hall, 2007; Hall, Gjedde, and Kupers, 2008). Following these observations, involuntary autobiographical memories are assumed to be evolutionarily older than voluntary autobiographical memories. Because they operate through quite simple associative mechanisms, certain forms of involuntary conscious remembering are likely to be present in other species, as I will argue in Chapter 8. The present theory thus extends the notion

of episodic memory by including an involuntary retrieval mode, which challenges the way this memory system has been conceived in some contexts (e.g., Suddendorf and Corballis, 2007).

The present theory is an alternative to psychodynamic theories of involuntary autobiographical memories. In particular it contradicts some contemporary clinical theories, according to which involuntary conscious memories of traumatic events reflect the operations of special memory systems or mechanisms, dedicated to emotionally stressful material. The present theory is also an alternative to standard cognitive theories of involuntary autobiographical memories, which typically do not specify involuntary retrieval mechanisms beyond references to the encoding specificity principle. Finally, the present theory is able to explain some of the “freshness” and novelty that are emphasized in aesthetic accounts of involuntary autobiographical memories, such as in the famous descriptions provided by the French author Marcel Proust (1932–8). We will consider psychodynamic, cognitive, and aesthetic theories in the following. The review is partly historical and is intended to provide the reader with an insight into the diverse theoretical backgrounds for studies of involuntary autobiographical memories. Readers who are less interested in such theoretical understanding may skip the review, or postpone it for later.

PSYCHODYNAMIC THEORIES

Under this heading I describe a family of theories of involuntary autobiographical memories that are either rooted in, or inspired by, a psychodynamic view of the mind. This review covers three related topics that have all been addressed by psychodynamic theories: involuntary daydreaming of anticipated future events, involuntary recollections of traumatic events, and involuntary symbolic memories.

Involuntary daydreaming

Fantasies of future events and memories of past events were intertwined in the Freudian model of the mind, as they are in modern

theories of episodic memory (Tulving, 1985, 2002). Memories could become painful (even traumatic) to the person by being associated with fantasies of wish fulfillment that the person had suppressed. In the case of Dora to be described in more detail shortly, Freud (1905) argued that certain aspects of “Herr K”’s sexual approach had become repressed by Dora because it was associated with unconscious sexual wishes. Also, memories could become traumatic many years after their occurrence in response to later events that placed the original event in a new troublesome light – a phenomenon labelled deferred action [*Nachträglichkeit*] (Freud, 1895; Gammelgaard, 1992).

In Freud’s (1908) understanding, daydreaming is essentially the projection of wish fulfillment into future events in the service of a temporary drive reduction. Intense daydreaming could lead to hysterical attacks. This could happen if the content of the daydreams had been repressed and then intruded into consciousness in the form of involuntary fantasies. “All hysterical attacks which I have been able to investigate up to the present have proved to be involuntary daydreams of this kind breaking in upon ordinary life” (Freud, 1909, p. 114). Breuer observed that certain non-demanding activities, such as knitting or playing scales, were especially likely to evoke daydreams. He expressed concern that daydreaming might form a “substantial predisposition to a genuine pathological splitting of the mind” (Breuer and Freud, 1893–5, p. 234).

Daydreaming was motivated by the pleasure principle – i.e., a striving towards the satisfaction of basic instinctual needs to reduce the amount of internal excitation. The pleasure principle was driven entirely from within the organism. A competing motivational factor was the reality principle, which demanded the postponement of satisfaction or precluded certain possibilities for gaining satisfaction, which might involve repression (Freud, 1920a).

This contradistinction between internal sources of stimulation that belong entirely to the individual and tend to operate independently of the external world, on the one hand, and stimuli and requirements from the external world, on the other, is reiterated in

Jerome Singer's seminal work on daydreaming (1966, 1975). Singer described daydreaming as an internal stream of thought (cf., James, 1890) that operates largely independently of external stimulation (see also Chapter 1). He assumed the brain to be continuously active, for which reason the organism was "constantly confronted with a competing source of stimulation from within" (1966, p. 139). This claim is consistent with findings in brain imaging research showing high levels of brain activity during resting states (e.g., Mazoyer *et al.*, 2001).

Singer acknowledged Freudian psychoanalysis as a source of inspiration, but, unlike Freud, he did not assume daydreaming to derive from suppressed desires and to serve drive reduction. In his view, daydreaming would often have purely cognitive functions, such as planning or problem solving. The onset of daydreaming was usually involuntary, although it could also be initiated in a willful way. Consistent with Breuer's observations, Singer also suggested that one important function of daydreaming was to maintain arousal during periods of boring, monotonous work. Antrobus, Singer, and colleagues demonstrated the validity of this idea in a series of experiments showing that the frequency of daydreaming (operationalized as task-irrelevant, spontaneous cognition) increased with increasing space between signal presentations in signal detection tasks (Singer, 1966, 1975, for reviews). Thus the likelihood of engaging in task-irrelevant thinking increases with decreasing demands of the ongoing task. If intense daydreaming is indeed a risk factor for the development of psychopathology, such as hysteria, as argued by Breuer and Freud (1893–5), these findings suggest that the restrictive female upbringing with its obligatory acquisition of intellectually unchallenging skills (e.g., needlepoint) may be partly to blame, consistent with Breuer's worry.

Singer (1966) described the contents of daydreaming broadly. It involved autobiographical memories as well as fantasies of future events. It could even occur without involving the self as a character. Some daydreams (for example in childhood) involve only

fictitious characters, such as superheroes accomplishing admirable deeds. This is unlike past and future mental time travel as defined in the episodic memory literature (e.g., Wheeler *et al.*, 1997; Tulving, 2002), which by definition involves the self as a character. Thus, the notion of daydreaming does not map directly onto the notion of (involuntary and voluntary) episodic memory, in spite of some similarities.

According to Singer (1978, 1988), the specific content of daydreaming is partly determined by unfinished intentions, goals, or unresolved problems pertaining to the person's emotional life. A related view was developed by Eric Klinger (1971, 1978, 1990), who argued that automatic thoughts and imagery (which he called "respondent thought") are selected and shaped through an interaction between internal motivational factors and external environmental cues. Thus, partly in contrast to Singer (1966), Klinger did not argue that involuntary thought processes were "situation independent," since they were shaped by cues in the present, external situation together with motivational factors belonging to the individual. In order to describe the latter, he introduced the notion of "current concerns," defined as "the state of an organism between the time it becomes committed to pursuing a goal and the time it either gains the goal or abandons the pursuit" (1978, p. 249). A current concern is an inner state of the organism that increases the sensitivity of the individual or organism to concern-related situational cues. Klinger and colleagues have demonstrated the effects of current concerns in several experiments (e.g., Nikula, Klinger, and Larson-Gutman, 1993). In Klinger's (1990) account, daydreams are quite goal-directed: "Daydreams and other thoughts arise when we run into something – such as a word, an event, or a thought – that reminds us, consciously or unconsciously, of our unmet goals in situations that do not lend themselves to meeting those goals" (p. 36). As pointed out by Singer (1993), the notion of current concerns can be seen as an operationalization of the Freudian wish in its early form – that is, an unfulfilled intention or objective that did not need to have a sexual content.

Following these theorists, daydreams are largely (but not necessarily) thoughts that are triggered automatically. These thoughts can involve both memories of personal past events and envisionings of future events. In addition, the empirical work on daydreaming has documented important individual differences in the propensity to daydreaming (see Klinger, 1990, for a review).

Involuntary recollections of traumatic events

Freud was quite silent about involuntary autobiographical memories in waking life. Although they received some mention in passing, they never constituted a major part of his theoretical work. Instead of involuntary conscious recollections, Freud was much more concerned with involuntary forgetting and underlying pathogenic memories expressing themselves indirectly in behavioral symptoms or in dreams (Freud, 1900, 1901). Thus, even though he and Breuer argued that hysterics “suffer mainly from reminiscences” (Breuer and Freud, 1893–5, p. 7), they did not mean that hysterics were flooded by involuntary conscious recollections, but that their symptoms were due to unconscious repressed memories (Gammelgaard, 1992). Nonetheless, parts of his conception of the mind have had a great impact on contemporary theories of involuntary autobiographical memories after traumatic events, because his view on the organization of the psychic trauma has been extended to explain such memories.

During and after World War I, psychiatrists and physicians in Europe tried to cure the thousands of soldiers who suffered from war neuroses (e.g., Rivers, 1920; Young, 1995). Among the symptoms were intense nightmares about traumatic experiences from the war. These nightmares could hardly be explained in terms of a striving for pleasure, which led Freud to reconceptualize his earlier work. Instead of contrasting a pleasure and reality principle, he introduced a contrast between the life instinct (Eros) and the death instinct (Thanatos) – the latter defined as an urge of all organic life to restore an earlier inorganic state (Freud, 1920a). He argued that the painful

nightmares about combat reflected the workings of the death instinct. He also, however, acknowledged the possibility that repeated nightmares were ways of “working through” and coming to terms with the trauma. As we shall see shortly, the latter idea has been elaborated by contemporary theorists, who have speculated that posttraumatic stress reactions are due to difficulties with processing the trauma, so that the trauma constitutes an unfinished cognitive task (see Horowitz, 1986, for a review).

In Freud’s model of the mind, a trauma is not defined in terms of objective characteristics (such as danger to life or injury in the DSM definition of trauma, American Psychiatric Association, 2000) but entirely in terms of its impact on the person. A traumatic stimulation was an impression from the external world that was sufficiently powerful to break through what Freud (1920a) termed the protective shield of the nervous system. An event was traumatic because it exceeded the processing capacity of the person and therefore could not be elaborated and integrated into the person’s knowledge about him or herself. According to Freud (1920b): “An experience which we call traumatic is one which within a very short space of time subjects the mind to such high increase of stimulation that assimilation or elaboration of it can no longer be effected by normal means” (p. 243). Specifically in relation to war neuroses, Freud (1919) speculated that the key feature was an incompatibility between the old self-schemata (ego-structures) from the time before the war and the new ones that had developed after the war.

This view that a traumatic memory causes problems because of lack of integration into the person’s pre-existing knowledge is central to most modern theories of PTSD. Moreover, such lack of integration has been linked specifically to involuntary conscious recollections of the traumatic event. This connection was made by Horowitz (1969a), who argued that a traumatic experience would remain in “some special form of memory storage” (p. 552) until it was integrated and mastered. This special memory storage was labelled *active memory*

storage, because it had an inherent tendency to automatically bring its own content to consciousness.

The active memory storage in Horowitz's theory dealt with conscious involuntary memories (including dreams) of the traumatic event and enabled such memories to repeat themselves in consciousness. Such involuntary conscious memories in waking life did not play a major role in Freud's writings about posttraumatic reactions (e.g., Freud, 1919, 1920a) nor in did they figure in Rivers's (1920) account of war neuroses. In both accounts, nightmares were seen as the dominant way of reliving the traumatic experiences in consciousness. Unbidden memories in waking life seem to have become identified as a major posttraumatic stress reaction mainly through Horowitz's pioneering work in the late sixties and seventies (e.g., Horowitz, 1969a, 1975; Horowitz and Becker, 1973). In his theory, involuntary conscious memories of the trauma would be a vehicle for working through and integrating the traumatic event into normal memory structures. However, because the involuntary memory fragments would be associated with intense unpleasant emotion, the person would attempt to avoid them, which would be counterproductive for the integration process. Many contemporary trauma theorists have elaborated and extended Freud's and Horowitz's disintegration view, as I shall argue in Chapter 7. I shall also argue that although this view is widespread, the evidence for it is weak.

To examine the claim that involuntary autobiographical memories are due to the operations of a special memory system dedicated to stressful/traumatic material, Horowitz and colleagues (Horowitz, 1986, for a review) conducted a series of experiments, all showing that students had more intrusive memories after watching an emotionally stressful film than after watching a neutral film. They also showed that the individual level of stress while watching the film predicted the frequency of subsequent intrusive memories about the stressful film. One problem with this paradigm is the lack of a voluntary memory condition. It is therefore unclear whether

emotional stress selectively enhances involuntary memory (as argued by Horowitz and colleagues and later theorists) or whether *voluntary* memory is enhanced as well (see Hall and Berntsen, 2008, for evidence supporting the latter). The latter is consistent with the episodic memory theory of involuntary autobiographical memories that I outlined in the beginning of this chapter. According to this view, we should not expect emotion at encoding to have differential effects on involuntary versus voluntary recall. The two views will be discussed more thoroughly in Chapter 7.

Horowitz's extension of Freud's work had great impact on the PTSD diagnosis (American Psychiatric Association, 2000). Horowitz's notion of the *active memory storage* and the interplay between avoidance and intrusion appears to draw upon Freud's (1914) notion of repetition compulsion – i.e., a tendency to repeat stressful or traumatic material, for example in dreams or behavioral enactments. Repetition compulsion is closely related to repression. The ability to compulsively repeat itself is a property that a certain problematic material gets from being repressed and holds as long as it is repressed. If the repression is removed (typically through treatment) the compulsive repetition will cease (Freud, 1914).

Although Freud (1920a) tied repetition compulsion to the notion of the death instinct, compulsive repetitions of the traumatic material could be a way of making up for the fact that the trauma had not been mastered and fully processed when it took place because of its overwhelming nature. The idea of a causal link between lack of integration and compulsively repetitive memories is maintained in many theories of involuntary trauma memories in PTSD (Brewin, Dalgleish, and Joseph, 1996b; Ehlers and Clark, 2000; Ehlers, Hackman, and Michael, 2004; Horowitz, 1986; van der Kolk and Fisler, 1995).

One important difference between Freud's ideas and contemporary theories of intrusive trauma memories should be noted. Modern theories of intrusive trauma memories often assume that such memories are exact copies of key aspects of traumatic events – i.e.,

consciousness is transparent, there is a one-to-one reference to a past reality. For example, Horowitz and Reidbord (1992) argue:

In general, the more a person experiences extreme terror during the event, the more likely the imagery of that event will be inscribed in the same sensory modalities of memory as perceptions. These memory inscriptions tend to return to conscious representation in that same modality and, because of their vividness, tend to re-evoke the same emotions as the original experience (p. 347).

Similarly, Brewin and Holmes (2003) argue that involuntary recollections of traumatic events elicited non-verbally through situational cues “are not altered in any way but remain intact and may be vividly experienced again in the future” (p. 359).

In a classical Freudian account, however, the trauma would not repeat itself in consciousness in such a transparent way in most cases (e.g., Kihlstrom, 1997). The reference to the underlying trauma would usually need interpretation (i.e., psychoanalysis) to become evident. Thus the actual memories would be symbolic, rather than verbatim representations of the trauma (see also Berntsen and Rubin, 2008).

Involuntary symbolic memories

Spence (1988) takes a classical psychoanalytic approach in an account of involuntary autobiographical memories in which they are described as disguised symbolic references to underlying fantasies and wishes. According to his observations, involuntary autobiographical memories often arise with no identifiable cues, and they usually come to mind when the person is in a passive state of awareness, such as falling asleep, for which reason he labels them *passive remembering*. Spence illustrates his claims with examples from literature, but does not provide systematic empirical evidence. An involuntary memory can be viewed as an encrypted comment to the situation in which it occurs. It may represent a piece of insight

and help the person understand the situation, if interpreted correctly. Or the memory may serve as a perceptual defense, preventing the person from becoming aware of certain aspects of the surrounding situation. It may also serve as a screen memory (Freud, 1899) blocking out other, more threatening memories. For example, Spence quotes an extract from Richard Wright's autobiography *Black Boy* describing a memory scene of his father leaving with a strange woman: "Many times in the years after the image of my father and the . . . woman, their faces lit by the dancing flame, would surge up in my imagination so vivid and strong that I felt I could reach out and touch it" (Wright in Spence, 1988, p. 312). In Spence's (1988) interpretation, the persistent memories of the faces and the fascination it evokes might protect the autobiographer from noticing other, more disturbing aspects of the painful childhood scene.

Spence's (1988) observations are quite similar to reflections made by Freud in relation to his treatment of Dora (Freud, 1905) – a young girl who became Freud's patient because she suffered from various nervous symptoms. She lived at home with her mother, father, and brother under quite complicated circumstances. She knew that her beloved father was having a sexual relationship with "Frau K" – a friend of the family to whom Dora was much attached and, according to Freud, even sexually attracted. To make things worse, "Frau K"'s husband, "Herr K," had approached Dora sexually on more than one occasion. Among other things, Dora was plagued by unwanted thoughts about the relationship between her father and "Frau K." "'I can think of nothing else,' she complained again and again" (p. 47).

According to Freud (1905) these unwanted thoughts owed their existence to unconscious defense mechanisms. Their persistence served to conceal other more disturbing ideas:

Reflection will suggest that *this exaggerated train of thought must owe its reinforcement to the unconscious*. It cannot be resolved by any effort of thought, either because it itself reaches

with its roots into unconscious, repressed material, or because another unconscious thought lies concealed behind it (p. 47).

Thus persistent involuntary thoughts (and memories) may serve to defend the person against insight into unconscious conflicts. These comments on Dora are one of the rare occasions where Freud explicitly discussed involuntary autobiographical memories coming to consciousness in waking life. As mentioned, with regard to involuntary manifestations of memory, Freud was more concerned with involuntary *unconscious* memory (memory unconsciously influencing behavior) or involuntary conscious memories figuring in dreams. However, in psychotherapy, conscious memory images and thoughts arising spontaneously during free association were important clues to the underlying web of unconscious wishes and defense mechanisms, which together had determined their specific occurrence (Freud, 1940).

Summary of psychodynamic theories

Projecting oneself into the future and recollecting the past are closely intertwined processes, according to a psychodynamic view. This is very similar to the way these two processes are described in modern theory of episodic memory (Tulving, 1985; Tulving, 2002). In a classical Freudian view, daydreaming worked in the service of the pleasure principle by generating images of wish fulfillment to reduce tension. The notion of daydreaming in more recent psychodynamic theories refers to thoughts of both future and past events that are usually triggered automatically and are likely to be motivated by current concerns of the individual. Contemporary trauma theories arguing that involuntary memories of traumatic events are due to a lack of integration of the traumatic event can be seen as rooted in Freud's view of the psychic trauma as an experience that causes a chronic disturbance of the emotional and cognitive balance of the person. The fluctuation between re-experience and avoidance symptoms, described by Horowitz and incorporated into the PTSD

diagnosis, is reminiscent of the Freudian notion of repetition compulsion. However, involuntary conscious memories in waking life were not central to Freud's view of traumatic neuroses. The idea of involuntary conscious memories as a traumatic stress response seems to have been introduced much later (see Chapter 7). In a classical psychoanalytic view, involuntary conscious memories would not be direct representations of the traumatic material, but would often intrude into consciousness in order to conceal other more disturbing memories or thoughts. This is contrary to contemporary PTSD theories, in which involuntary recollections of traumatic material are often seen as exact copies of emotionally upsetting parts of the traumatic event. These issues will be further discussed in Chapter 7 on involuntary memories of traumatic events.

COGNITIVE THEORIES

This group of theories is rooted in the experimental literature on memory and cognition. Although they share this overall framework they differ substantially from one another. The first to be considered is clearly inspired by questions raised by the psychodynamic approach, and the attempt to account for such issues in terms of cognitive processes. The second group of theories has tried to explain involuntary memories within an information processing framework, whereas the third group has provided neural accounts of involuntary autobiographical memories.

Cognitive theories cultivating psychodynamic ideas

Thought suppression Experimental research on thought suppression can be seen to relate directly to some of the psychodynamic tenets considered in the previous section. Thought suppression is the process of actively trying to prevent certain thoughts from entering into consciousness. In numerous experiments, Wegner and colleagues have demonstrated a paradoxical effect of such attempts. Instead of leading to a diminished access to the unwanted target thought, the efforts at getting rid of the thought paradoxically

increase its likelihood of intruding. This effect has been demonstrated with many different kinds of target thoughts – such as an image of a white bear, neutral words, unpleasant pictorial stimuli, and social stereotypes (Wenzlaff and Wegner, 2000). Moreover, it has been demonstrated with many different measures of the increased accessibility of the target, involving both self-reports (e.g., recording thoughts as they occur) and indirect measures of accessibility (e.g., the Stroop task or forming sentences of scrambled words) (Wenzlaff and Wegner, 2000). Importantly, an increased accessibility of the target thought as a result of preceding thought suppression has been found for both involuntary and more standard voluntary retrieval tasks (e.g., Rassin, Merckelbach, and Muris, 1997).

According to Wegner (1994, 1997, see also Wenzlaff and Wegner, 2000) the paradoxical effect of thought suppression is due to dual processes of mental control. In order to keep something out of awareness (e.g., worries about a future event) a voluntary operating process seeks to establish the intended state (i.e., no conscious awareness of the thought), while an involuntary, unconscious monitoring process screens mental life for contents that signal a failure to accomplish this goal (i.e., indications of the target thought). The latter renders the unwanted thought more accessible than it would have been without suppression, when the intentional operating process is brought to an end in the experiment or is distracted by other tasks in daily life.

At a first glance, Wegner and colleagues' findings on paradoxical effects of thought suppression could be seen to support the psychodynamic tenet that avoidance (or repression) generates intrusions, and thus as consistent with Horowitz's conception of an active memory storage as well as the Freudian notion of repetition compulsion. However, there is one important difference between the experimental findings on thought suppression and the psychodynamic view. The findings show a general enhancement of the accessibility of the target thought that is observed independent of retrieval strategy. Thus the enhancement is not limited to involuntary recall.

For example, Rassin *et al.* (1997) showed their participants a fragment of a negative film, and asked one group to actively suppress the film afterwards while the other group got no specific instructions. As expected, the suppression group had more intrusive thoughts about the film. However, they also scored higher on measures for subjective clarity when voluntary recall was examined. Thus suppression had enhanced rather than impaired the participants' memory for the film, also when measured through voluntary recall. Findings from other studies point in the same direction (see Wenzlaff and Wegner, 2000, for a review, but see also Wegner, Quillan, and Houston, 1996).

Following these findings, not just involuntary but also voluntary access to the target thought or memory is paradoxically enhanced by the effort at suppressing the thought. The fact that the enhancement concerns both types of recall is very important, because it is counter to what would be expected from a classical psychodynamic point of view. Horowitz (1969a) explicitly limits his active memory storage to involuntary memories, and Freud's idea of repetition compulsion certainly did not imply increased conscious and voluntary access to the repressed material. However, the findings agree very well with the episodic memory theory of involuntary autobiographical memory, because they agree with the idea that accessibility is enhanced by the same basic factors irrespective of whether recall is involuntary or voluntary.

The finding that thought suppression also enhances access when measured through strategic recall is one important reason why the contributions by Wegner and colleagues should not be classified as psychodynamic. Another reason is that Wegner and colleagues do not provide a global theory of unwanted thoughts, in contrast to the psychodynamic approach. For example, they do not explain under which conditions a certain thought (e.g., the idea of having a drink) becomes unwanted, whereas Freud attempted such clarification by hypothesizing an overarching conflict between a pleasure principle and a reality principle in mental life. Also, no data are presented

concerning the relative frequency of unwanted thoughts in daily life and how often they involve reactivations of autobiographical memories. The relevance of this work to everyday involuntary autobiographical memories is therefore unclear. However, if involuntary autobiographical memories were to be explained in terms of mechanisms related to thought suppression, we should expect them to be somewhat upsetting to people, which is generally not the case, as I will show in Chapter 4.

Preconscious spreading activation In a recent chapter, George Mandler (2007) asks what makes some features of our environment and thought efficient triggers for involuntary memories while other potential triggers do not spontaneously elicit a memory. He argues that in answering this question:

We need to make contact with classical psychoanalytic theory. For the Freudian analyst the triggering of some or any memory is indicative of some underlying psychodynamic tension. The Freudian had no problems with the question of why some events – mind-pops or autobiographical episodes – come to mind unbidden. The event is motivated and can be pursued by some such method as free association, to find the psychodynamics underlying what must be an unconscious “choice” (pp. 219–20).

Despite this very clear dedication to Freud, Mandler’s account of involuntary remembering is not really psychodynamic because it does not discuss how such underlying psychodynamic tensions specifically determine the content of involuntary memories. The influence from psychoanalysis seems to be limited to the idea of preconscious spreading activation as a key factor for involuntary memories. Spreading activation refers to the automatic activation of nodes in an associative network. Preconscious spreading activation is a non-conscious state of activation that is potentially accessible for consciousness. This form of activation is not governed by an explicit search, but is initiated automatically. It stimulates greater parts of an

associative network than does conscious activation, according to Mandler (1994). A conscious and deliberate attempt at retrieval, in contrast, has restricting effects. For that reason, material that may be inaccessible in response to a voluntary and goal-directed retrieval effort may spontaneously come to mind when such goal-directed retrieval attempts have been stopped. In this view, involuntary autobiographical memories should be able to access events or parts of events that may be inaccessible for goal-directed search. Also, the involuntary memories might be richer in details than voluntary memories, because they are the product of enhanced spreading activation. We should also expect their occurrence to be most frequent in a relaxed state of awareness because such a state would form optimal conditions for preconscious spreading activations, according to Mandler. In addition to agreeing with parts of the psychodynamic approach, this view is consistent with some of the tenets of aesthetic theories of involuntary memories, which we shall turn to later in this chapter.

Direct retrieval and the censorship of the self Conway (1992) introduced the notion of direct retrieval to refer to conscious recall that is subjectively experienced as arising spontaneously. This form of recall takes place outside of retrieval mode, thus, with no conscious search. The direct retrieval process is initiated by a cue that is sufficiently distinctive to lead to the automatic construction of a memory representation through spreading activation in an associative autobiographical memory network. Its alternative is generative (i.e., voluntary/strategic) retrieval, which in Conway's model refers to a cyclic search process governed by a conscious memory specification (see also Conway and Pleydell-Pearce, 2000). The idea of direct retrieval relies heavily on the notion of encoding specificity (Tulving and Thomson, 1973) according to which an episodic memory cue is effective only if it was encoded together with the to-be-remembered item of information. In fact, in a recent revision of his theory, Conway (2005) states that "the term 'direct retrieval' is simply a

convenient synonym for encoding specificity" (p. 619). Thus, following this statement, Conway seems to have no theory of involuntary autobiographical memories beyond the allusion to encoding specificity. As I shall argue in Chapter 5, findings on cues for involuntary autobiographical memories certainly support the idea that encoding specificity plays a central role for their activation. However, this notion by itself is unable to provide a full account of how involuntary memories are brought to mind. For example, it does not explain how a certain memory is selectively activated in cases where the cue would be able to match several past events (a problem I will discuss in Chapters 5 and 6). As noted by Mandler (2007) in his discussion of this and related problems (see above), one possible solution would be to "make contact to classical psychoanalytic theory" (p. 219). Logically, this would take care of some of the problem because Freudian theory adds additional constraints to the selection of the memories in terms of complex, underlying motivational factors. A similar strategy is employed in Conway's theoretical model for autobiographical memory. In this model, a memory is only brought to consciousness if it agrees with goals of the working self and thereby helps optimize self-coherence (Conway, 2005). Thus the working self in Conway's model provides a censorship quite similar to the Ego in the psychodynamic framework (to which Conway acknowledges his debt). Logically, the reference to such censorship helps to take care of some of the problems related to how certain memories are unconsciously favored over others. In the case of multiple memory candidates, the memory that is most consistent with the goals of the working self would be unconsciously picked, according to this view. The notion of the working self has many similarities with Klinger's (1975) notion of "current concerns," because "current concerns" deals with self-relevant goals and places similar constraints on cue sensitivity and memory access. However, one problem with this approach is to determine what exactly constitutes a goal or a current concern for a given person at a certain moment in his or her life. At the present, we have no really good

methods for deciding, although some useful inventories have been developed (Klinger and Cox, 2004; see also Chapter 5).

Information processing theories

Theories in this class share the assumption that the activation of involuntary autobiographical memories is contingent on cues in the retrieval situation, and that the relative efficiency of the cues reflects how well they match underlying structures in the organization of long-term memory. The theories disagree as to which types of cues are most common or most relevant for our understanding of involuntary autobiographical memories – notably, whether sensory cues or abstract conceptual cues are more important. This disagreement reflects different assumptions as to the underlying organization of long-term episodic memory.

Schank (1982, see also Schank, 1999) presented a theory of a “dynamic memory” in a book with the same title. In this work, Schank attempts to resolve a paradox associated with a rule-oriented approach to cognition. If cognition is rule-driven, how do we handle novel events for which no rules (e.g., no scripts) apply? Schank’s suggestion is that we process such unscripted encounters on the basis of involuntary memories (“reminding,” p. 19) of similar situations in the past. The involuntary memory is assumed to be triggered by the overall structure of the present situation – e.g., “goal, plans, themes” (p. 48) – more specifically, by an isomorphism between structures governing the processing of novel situations and structures of long-term memory:

We are reminded of a particular experience because the structures we are using to process the new experience are the same structures we are using to organize memory (p. 25).

The function of the involuntary reminders is to enable the processing of novel situations on the basis of representations of analogous situations in the past, which may form the beginning of a new, higher-order structure in memory. In support of Schank’s

suggestions, Ross (1984) found that relevant reminders of former episodes frequently occur during learning a new skill (e.g., word processing) and also that such reminders appear to improve performance.

Although Schank (1982) focused on abstract (goal-structure) similarities between events, he acknowledged that reminders may be triggered by concrete contextual features, such as sensory impressions. However, such involuntary memories “are not very relevant to the operations of a dynamic episodic memory,” according to Schank (1982, p. 26), for which reason he largely ignored them in his account.

In contrast, in a theoretical account on the organization of event memories, Morton and his colleagues addressed the type of involuntary memories that Schank left out. Morton, Hammersley, and Bekerian (1985) proposed that memories are stored as discrete records, each attached to an access key – or heading – through which the memory is activated. The access key has no propositional relationship with the content of the memory, but includes “literal representations of the nominal event, including environmental features surrounding the event, and internal states existing at the time an event is experienced” (p. 7). Following this view, efficient cues for involuntary autobiographical memories would often be sensory features that are peripheral to the content of the memory:

The third class of memory experience which appears ubiquitous is the experience of a memory being triggered spontaneously by something which was just a part of the background for an event and irrelevant to the content of the memory. Common triggers of such experiences are specific locales in town or country, scents and certain pieces of music. (Morton, 1990, p. 5)

More recently, similar ideas have been proposed in theories of involuntary memories of traumatic events. For example, Ehlers and Clark (2000) propose that non-semantic, perceptual-sensory cuing may be extraordinarily frequent for recurrent traumatic memories.

One major problem with the information processing theories considered here is that they provide no systematic evidence for their theoretical claims about involuntary memories.

Neural theories

Research on which brain regions are involved with episodic memory agrees that the medial temporal lobes (hippocampus and surrounding areas) are crucial for binding information into representations of events both at the time of encoding and (with the possible exception of some memories for remote events) at the time of retrieval (e.g., Moscovitch, 1995; Rubin, 2006). Areas in the prefrontal cortex, on the other hand, are necessary for initiating and monitoring goal-directed memory search (e.g., Hall, 2007; Svoboda, McKinnon, and Levine, 2006, for reviews). Following this division, we should expect involuntary autobiographical memories to be associated with activity in the hippocampus and surrounding areas, but not with activity in the prefrontal areas, because no voluntary search is involved. Very few brain imaging studies have been conducted on involuntary conscious memories; however, the few studies that exist generally confirm this prediction (Hall, 2007, for a review). Notably, a recent Positron Emission Tomography (PET) study has shown that both involuntary and voluntary recall of emotional pictures activates areas in the medial temporal lobes and other areas associated with retrieval success, whereas voluntary compared to involuntary recall showed enhanced activity in areas in the right prefrontal cortex that are known to be involved in strategic retrieval (Hall *et al.*, 2008).

Wilder Penfield's observations on responses to electrical stimulation on the brain surface during neurosurgery were the first to suggest the importance of the temporal lobes for spontaneous activation of autobiographical memories. In response to electrical stimulation on the temporal lobes, some patients reported dreamlike states involving images of sensory impressions or scenes from their past. The memories were generally in the form of fragments, with many details missing. For example, one woman reported: "Dream is

starting. There are a lot of people – in the living room – I think one of them is my mother” (Penfield, 1947, p. 91). Penfield examined a total of 1,132 patients with electrical stimulation to the brain surface. Reports of memory activation were only observed among patients who had electrical stimulation to their temporal lobes, and among these only a minority (8 percent) reported involuntary memories (Squire, 1987). Nonetheless, the findings are in line with the idea that the hippocampus and surrounding areas are central for the experience of involuntary autobiographical memories.

Although this is important, it does not in itself constitute a theory for the activation of involuntary memories. So far, the most developed neural theory of involuntary conscious memories was introduced by Morris Moscovitch in the early nineties (e.g., Moscovitch, 1995). He argued that structures in the medial temporal lobes, hippocampus (MTL/H), and related limbic structures are responsible for the encoding and reactivation of memories of consciously experienced events. He distinguished associative retrieval (when the cue alone is sufficient for retrieval) from strategic retrieval (when the cue provides only the starting point for a more deliberate memory search) – a distinction that appears to map onto the distinction between involuntary versus voluntary recall employed here. Moscovitch proposed that a module located in the MTL/H is responsible for both the encoding and associative reactivation of conscious experiences (i.e., personally experienced episodes). The memory trace is not stored in the MTL/H, but in the neocortical structures that have mediated the processing of the event. The role of the MTL/H module is to bind these neural elements together in a coherent conscious experience both at encoding and at retrieval. Following Fodor (1983) the module is (a) domain specific, (b) informationally encapsulated, and (c) has a shallow output. In the present context this means that (1) it is limited to consciously apprehended information, (2) it is dependent on relevant cuing and is automatic once it has become initiated by a relevant cue, and (3) that it is in need of further interpretation and contextualization. The memory

that is activated as a result of this modular process is “stripped of meaning within a larger semantic and episodic framework” (p. 284). It comes with only an associative context, which is the “multimodal spatial and temporal background within which the target is embedded and comprises an event” (p. 284). As we shall see later in this chapter and in Chapter 6, this characterization can be seen to agree with an aesthetic view of involuntary autobiographical memories, according to which a key characteristic of such memories is their freshness and lack of contextualization in well-established personal frameworks of meaning.

Because the modular retrieval process is dependent on a relevant cue, a crucial question is what constitutes such cue? As was the case with Conway (2005), Moscovitch (1995) has no further specification of the cue than a reference to the principle of encoding specificity. Thus “only those retrieval cues that reinstate an aspect of the encoding context lead to conscious recollection of a target event” (p. 283). This solution, of course, suffers from the same limitations as were mentioned earlier in relation to Conway’s notion of direct retrieval. First, it does not clarify how a certain memory is chosen over others in cases where several memories involve features that match a present cue. Neither does it clarify why we are not constantly flooded by involuntary memories. If the MTL/H module processes incoming information as well as automatically activates stored information when a feature in the incoming stimuli matches a feature of a stored event, this would seem to lead to a constant flood of involuntary conscious memories. As a minimum, some inhibitory mechanism seems to be needed for the module account to work. Alternatively, the cue conditions need to be specified beyond the notion of encoding specificity. This problem will be discussed further in Chapters 5 and 6.

Summary of cognitive theories

Suppression of unwanted thoughts has been shown to enhance the target thought. This paradoxical effect is present irrespective of

whether accessibility is measured through involuntary or voluntary recall. These findings are consistent with the view that involuntary and voluntary memory follow the same pattern with regard to factors affecting encoding and maintenance. It is counter to a psychodynamic view assuming that trying to block something from awareness has different effects on involuntary versus voluntary memory. Cognitive theories of the retrieval of involuntary autobiographical memories invoke the encoding specificity principle, but fail to explain (1) how one particular memory is specified and construed if several memories fit the cue and (2) why we are not constantly flooded by involuntary memories. Neural theories have speculated that involuntary memories may occur through the activation of the hippocampus and related areas and without the involvement of executive processes located in the frontal lobes. Recent evidence supports to this view.

AESTHETIC THEORIES

Although many authors and autobiographers have described involuntary memories as a source of pleasure and insight, the best-known representative of an aesthetic view on involuntary autobiographical memories is the French author Marcel Proust, who made the phenomenon famous and celebrated in his extensive autobiographical novel *Remembrance of things past*. In this important work, the narrator describes several instances of involuntary autobiographical memories, including, but not limited to, the frequently cited example of a remote childhood memory activated by the taste of a *petite madeleine* soaked in tea. The memories described by Proust typically involve the unexpected recovery of a seemingly long-forgotten scene. Moreover, the memories are often about remote events, although Proust also described involuntary memories of recent experiences. The activation of the memories is heavily dependent on accidental cues in the environment, thus a good deal of chance is involved in their sudden occurrence. The dependence on chance is an aspect of involuntary autobiographical memories that Proust emphasizes.

The past is hidden somewhere outside the realm, beyond the reach of intellect, in some material object (in the sensation that material object will give us) which we do not expect. And as for that object, it depends on chance whether we come upon it or not before we ourselves must die (1928, p. 61).

The cues are typically external to the person. They are not limited to pure sensory impressions, such as taste or smell. Other senses may take part, and memories may also arise in response to the recognition of specific objects. In Chapter 6, I provide detailed examples of involuntary memories described by Marcel Proust in his *Remembrance of things past* and I discuss how their aesthetic qualities can be explained within the present episodic memory theory of involuntary autobiographical memories.

To Marcel Proust, involuntary recollections were the only way of genuinely capturing the past. The original French title of his famous novel, *À la recherche du temps perdu*, captures this aspect of longing and searching for a lost time through the medium of memory, which is missing in the English title. Compared to involuntary memories, personal memories recalled in a goal-directed fashion are experientially flat, unexciting, and devoid of that freshness and pure experiential quality that uniquely characterize involuntary recollections, according to Proust. The Russian author Esther Salaman has quite similar observations on involuntary memories. She emphasizes their freshness, the joy they may bring, and a strong emotional reliving associated with their occurrence: "There is another kind of memory experience, which comes unexpected, suddenly, and brings back a past moment accompanied by strong emotions, so that a 'then' becomes a 'now'" (Salaman, 1982, p. 52).

As pointed out to me by Martin Kvist Petersen, a Danish student of Italian literature, the Italian author Cesare Pavese also ascribes great significance to memories that arise spontaneously. For example, in one of his short stories ("Fine d'agosto"), a childhood memory is brought back to the narrator by a puff of wind and a

certain smell that it carried along. In the short story, this spontaneous memory seriously separates the narrator from his girlfriend, with whom he is unable to share the intense happiness associated with the memory (Pavese, 1955; see Petersen, 2004). The inexplicable and intense joy associated with the memory is strikingly similar to the instances described by Proust.

For Proust, the key to understanding these distinctive aesthetic qualities of involuntary memories is the fact that they come in a non-interpreted form. Because they come to mind unbidden and unexpected, often after long-term forgetting, their original qualities have been preserved rather than replaced by a narrative interpretation, contrary to what would typically be the case for memories activated in a voluntary, goal-directed way. Instead of being embedded in a narrative context built up through retrospective reflections and rationalizations, the involuntary memories come to mind embedded in their original experiential context, according to Proust. The result is a strong sense of reliving the past and a feeling of being re-embodied in a past identity.

Epstein (2004) relates Proust's aesthetic appreciation of involuntary autobiographical memories to William James's (1890) theory of the stream of thought, more specifically to his distinction between the focus of consciousness and its "fringe." The latter consists of the vaguely felt context for whatever is the focus of consciousness at the moment, such as preceding thoughts and sensations and a sense of direction for where current thoughts are heading. Because involuntary memories come uninterpreted, they come with their original fringe, thus they are able to instantiate the original experiential context and this is what grants them their unique aesthetic quality, according to Epstein (2004). He relates Proust's involuntary memories to artistic experiences more broadly and argues that a major goal of all art is to activate such inexplicable webs of experiential (sensory, spatial, and emotional) associations. The power of a work of art does not reside in the representation *per se* but in the richness of the associations that it is able to activate within the audience. Similarly,

autobiographical memories have an ability to convey aesthetic pleasure through the activation of embedded associations.

The central claim of the aesthetic theories of involuntary memories is that voluntary retrieval with its top-down search process is able to a lesser extent to activate the original experiential context and therefore has less of what (for want of a better term) may here be called the past "atmosphere." These claims can be related to Mandler's (1994) claim that involuntary recall is connected with more extensive spreading activation of underlying associative networks as well as to Moscovitch's (1995) claim that involuntary memory is "stripped of meaning within a larger semantic and episodic framework"(p. 284), but comes with an associative context, which is the "multimodal spatial and temporal background within which the target is embedded and comprises an event" (p. 284).

As pointed out by Epstein (2004), also contributing to the aesthetic importance of the involuntary memories is the fact that such occurrences can be seen to form what Epstein calls "narrative metaphors" by involving the simultaneous conscious appreciation of two events (the "then" and the "now") otherwise separated in time. Having an involuntary memory draws attention to the similarities and differences between the reality of the self in the present situation and its reality in the spontaneously remembered past situation. Such appreciation may at times be associated with strong emotions (e.g., grief or relief) and it may be an important automatic form of updating a sense of personal continuity, as I have argued elsewhere (Berntsen, 1999).

3 Ways to study the unbidden past

Indeed, I believe that if more psychologists were themselves willing to undergo the tests they devise or the experimental procedures to which they subject others, we would find a marked upsurge in the significance and vitality of research.

(Singer 1966, p. 15)

Why have cognitive psychologists been reluctant to study involuntary autobiographical memories, while voluntary autobiographical memory has been studied at length? Probably some of the answer has to do with the challenge of developing a useful method. In this regard, it is useful to remember George Miller's (1962) hesitation: "Consider the difficulties that would face any scientist who wanted to study such mental phenomena. His first difficulty would be that he has no way to capture the things he wishes to study. He can only sit and wait, hoping for the improbable" (p. 180; see also [Chapter 1](#)).

Obviously, I am much more optimistic than Miller. Nonetheless, I do not think that his skepticism was completely unwarranted. Although useful methods have been developed, methodology is still a problem that involuntary memory researchers have to consider very seriously. In this chapter, I will discuss various empirical approaches to involuntary autobiographical memories, including sampling, survey, diary, and laboratory methods. The diary method has been the most frequently used approach for studying everyday involuntary memories. Later in this chapter, I will therefore describe my first diary study on involuntary autobiographical memories, which had only me as a participant.

EMPIRICAL APPROACHES TO THE UNBIDDEN PAST

The most important hindrance to a scientific study of involuntary memories is precisely their key characteristic: they are unintended and therefore uncontrolled. Thus to ask a subject to have an involuntary memory would be a purely contradictory request. However, this does not necessarily render the phenomenon inappropriate for scientific investigation. Many phenomena in daily life share the same characteristics. A good example is naturally occurring errors such as turning on the wrong burner on the stove or locking your car keys inside the car. Nobody deliberately makes such mistakes. If they did, it would not be a mistake. Errors are involuntary by definition. They were studied systematically long before systematic research on involuntary autobiographical memories began (Reason, 1990; Reason and Lucas, 1984). Research on errors was therefore a good source of inspiration for the development of methods for involuntary autobiographical memory research. Reason (1990) delineates several ways in which human errors can be examined through scientific methods and summarizes four different research strategies: the sampling method, the survey method, the diary method, and the laboratory method. All of these methods have been used in relation to involuntary autobiographical memories. In the following, I will discuss their advantages and disadvantages.

The sampling method

One possible way of studying involuntary autobiographical memories is to collect examples of the phenomenon. Much in the same manner as a linguist gathers examples of utterances or the botanist collects exemplars of wild plants, the psychologist may collect examples of involuntary autobiographical memories. Indeed many theories about involuntary autobiographical memories (cf., Chapter 2) are based on such freely selected examples rather than on systematic studies. The examples are often gathered from fictional literature or from autobiographies (e.g., Epstein, 2004; Salaman, 1982; Spence, 1988), or they may derive from private anecdotes told by

acquaintances and relatives (e.g., Schank, 1982), or observations of clinical cases (e.g., Breuer and Freud, 1893–5; Ehlers *et al.*, 2002). As noted by Reason (1990), if collected systematically, a corpus of examples can be helpful in yielding a catalog of various subclasses of the overall phenomenon. However, a major weakness of this method is that researchers may be unwittingly inclined to look for examples that fit their theory and overlook examples that do not.

The survey method

One way of overcoming some of the problems associated with the sampling method is to use survey studies. Through this method, information about involuntary autobiographical memories can be obtained from many people in a manner that is less time-consuming than the diary method (to be described shortly) and more systematic than the sampling method. For example, Berntsen and Rubin (2002) used the survey method to examine frequency and emotional content of involuntary autobiographical memories in a large sample of the general population. Because the study involved participants across the adult lifespan, it was possible to examine age-related differences as well as how the remembered events were distributed over the adult lifespan (see also Berntsen and Rubin, 2008). Findings from this and similar studies will be described in Chapter 4. Survey studies on involuntary autobiographical memories may be conducted via face-to-face interviews, telephone interviews, or through paper-and-pencil questionnaires. Clinical interviews in which a sample of a specific patient population is questioned systematically about their experiences of involuntary autobiographical memories can be regarded as a variant of the survey methodology modified to particular groups. For example, Brewin and his colleagues have examined involuntary intrusive memories in people with depression and PTSD through clinical interviews (Brewin, 1998, for a review; see also Chapters 5 and 7).

One limitation of the survey approach is that it relies on people's retrospective assessments. This may be particularly problematic

in relation to examining involuntary memories, partly because such memories are generally very rapidly forgotten, if not recorded at once. Thus when people are asked to think about the last time they had an involuntary autobiographical memory, what comes to their mind may be a very distinctive (and thus easily remembered) occasion of having such a memory. Clearly, this may bias the results. For the same reason, retrospective assessments of the frequency of involuntary memories are bound to be very uncertain. As argued by Nisbett and Wilson (1977), people are generally poor observers of their own mental experiences. Their assessments of what causes them to behave in certain ways are often more influenced by their a priori beliefs than by their actual observations of the phenomenon under study. Therefore it is not recommendable to ask highly specific questions on the occurrence of involuntary memories as part of a survey study. Questions should be kept simple and not call for sophisticated retrospective self-observations. Ideally, survey studies should be followed up by other approaches that allow involuntary autobiographical memories to be recorded “online” – i.e., as they occur – rather than through retrospective (and indeed voluntary) recall of particular occasions of having them.

The structured diary method

In diary studies, participants make records of involuntary autobiographical memories immediately after they have occurred. This method therefore relies little on retrospection, which reduces the risk for contaminating self-reports with guessing and personal beliefs (Ericsson and Simon, 1980; Nisbett and Wilson, 1977). During the diary period (which may last several weeks), each participant carries a small booklet or an electronic data assistant with a fixed set of questions, which he or she is to answer whenever he or she becomes aware of an involuntary memory. In some studies (e.g., Berntsen and Hall, 2004) a voluntary memory condition is included to provide a comparison. This can be done for example by offering the participants a word cue for a voluntary memory each time an involuntary

memory is recorded, or by instructing the participants to record a voluntary memory from the same time period as the involuntary memory.

The diary method enables the researcher to examine the relation between each memory and the context in which it comes to mind. It is therefore a good way to get information on what may trigger involuntary memories in everyday life. It also allows the researcher to examine how the memory may affect the person's behavior and emotional state at the time when it comes to mind. As we saw in Chapter 2, most theories of involuntary autobiographical memories contain some hypotheses as to how the current situation of the person may facilitate the unexpected recall of an autobiographical memory. In particular, Spence (1988) underscored the importance of considering this relation: "Many cases of inadvertent recall are triggered by a repetitive context . . . and the memory takes on significance only within that context" (p. 312).

If this view is correct, the diary method is a highly relevant approach. On the negative side, the experimenter does not monitor the recording of the memories. It is therefore not clear whether the subjects conduct the diary study in exactly the way they have been instructed to. For example, the experimenter cannot know for sure that the subjects remember to record the memories whenever they come to mind. If a person has many involuntary memories, he or she may forget to record some of them or postpone the recording to later. Some of these problems can be reduced by making the recording procedures as practicable for the subjects as possible, which in turn will make them more likely to accomplish the task the way they have been told to do. For example, it is a good idea to delimit the number of involuntary memories that subjects are allowed to record on each day in order to make the diary task more accomplishable. If it is important to get a measure of frequency, one should reduce the number of questions answered for each memory to a minimum, or ask the subject to fill in an extensive questionnaire for only the first one or two memories that occur on each day, and merely mark

the occurrence of the subsequent ones. It is also recommendable to have the subjects hand in the questionnaires once every week (rather than by the end of the diary period). Furthermore, the use of electronic data assistants instead of paper-and-pencil notebooks enables an automatic recording of the exact time at which each record is entered. This makes it possible for the experimenter to check that the memories have in fact been recorded throughout the entire diary period and at distinct times (Bolger, Davis, and Rafaeli, 2003).

Laboratory methods

Compared to the diary method, the obvious advantage of laboratory methods is that they add control and allow more systematic manipulation of key variables. The cost may be a lack of ecological validity, especially if the laboratory method is developed without careful consideration of the everyday characteristics of involuntary autobiographical memories. A useful analogy in this respect is the early ethologists' observation of instinctual behavior elicited by key stimuli in the natural environment of the animal (e.g., Tinbergen, 1963). Only after such natural stimuli had been identified as triggers for a particular instinctual behavior did it make sense to try to manipulate this behavior in laboratory settings. In the same way, the relevance of laboratory studies on involuntary autobiographical memories depends on how well they are motivated by the natural phenomenon under study.

Two different classes of laboratory methods exist. One seeks to control encoding, the other retrieval. Ideally, both phases of the memory process should be under laboratory control, but so far only one study has come close to this ideal (Hall *et al.*, 2008). Encoding conditions have been manipulated in the so-called stressful film paradigm. The participants are shown an emotionally upsetting film under various conditions, and involuntary conscious memories (often called intrusive memories in this literature) with references to the content of the film are subsequently recorded either during pauses in a

laboratory task immediately following the film (Horowitz, 1986, for a review) or in a diary study conducted over the subsequent days (e.g., Holmes, Brewin, and Hennessy, 2004; see Holmes and Bourne, 2008, for a review). In one variant of this method (Hall and Berntsen, 2008), participants were shown discrete emotional pictures while recording their reactions to each of them. They afterwards participated in a diary study of involuntary (and voluntary) memories of the pictures. Keynote phrases in the booklet enabled us to identify which picture the participant remembered, and we could therefore examine their frequency and quality at recall as a function of responses recorded at encoding. Other studies have examined how conducting a parallel task during the encoding of a stressful film affects the number of subsequent involuntary memories of the movie recorded in a diary study (e.g., Holmes *et al.*, 2004). The stressful film paradigm is a relatively well-established method for studying involuntary conscious memories. One limitation of this method is that the content of the memories is not autobiographical. Also, only encoding, not retrieval, is subjected to experimental control.

Retrieval conditions have been manipulated in recent attempts at activating involuntary autobiographical memories in the laboratory. Because these studies are based on memory for autobiographical events, encoding is not subjected to laboratory control. Two studies have examined involuntary autobiographical memories as they occur during a continuous chain of associations. Ball (2007) asked his participants to provide free associations to a target word, such as "coffee." The chain of semantic associations was tape-recorded and afterwards played back to the participants. The participants were asked to stop the playback if they remembered that an involuntary autobiographical memory had come to mind at this point in the recording. They were then asked to provide a brief description of the memory. One disadvantage of this method is that the memory identification is done retrospectively. On the other hand, it is an advantage that the participants do not know beforehand that the

study is about involuntary autobiographical memories. Thus the participants are unlikely to be looking for involuntary autobiographical memories during the word-association task.

Mace (2006) studied involuntary autobiographical memories activated during a voluntary autobiographical memory task. The participants were asked to voluntarily recall memories from their high-school years in response to particular word phrases (such as being at a movie, sitting in the class). They were instructed to also recollect any involuntary autobiographical memory that possibly occurred during the voluntary retrieval task. One disadvantage of this method is that the participants, although instructed not to, may, ironically, start searching for involuntary memories during the voluntary memory task, thus blurring the distinction between the two types of memories. An important advantage is that both types of memories are recorded immediately when they come to mind, reducing retrospection to a minimum.

Schlagman and Kvavilashvili (2008) studied involuntary autobiographical memories as elicited by word phrases presented in line patterns to which the participants were instructed to pay close attention in order to identify a deviant pattern occurring at random intervals. They were instructed to ignore the word phrases, but asked to record any involuntary autobiographical memories that nonetheless might come to mind in response to the word phrases while conducting the line-detection task. Similar word phrases were used as cues in a voluntary recall condition. One important advantage of this method is that it allows reaction time to be measured. A disadvantage is that the instruction to record involuntary memories may cause people to start looking for such memories, although they are asked not to, thus blurring the distinction between involuntary and voluntary memories. In short, laboratory methods controlling the retrieval of involuntary autobiographical memories are still in their infancy, although some inventive attempts have been made.

A PRELIMINARY DIARY STUDY ON INVOLUNTARY AUTOBIOGRAPHICAL MEMORIES

For the reasons stated earlier, it appeared that a structured diary was the most appropriate way of pioneering a research project on involuntary autobiographical memories. Because no earlier diary studies had been conducted at the time, I decided to follow the advice of Singer (1966) quoted at the beginning of this chapter and study my own involuntary autobiographical memories before subjecting other people to the same procedure. Thus the study to be described involved only one participant, namely me – at that time a 31-year-old female graduate student in psychology. I will describe the method in some detail here, because it became the format for many subsequent diary studies. The specific details of the study can be found in Berntsen (1999), upon which the following is based.

Method

An involuntary autobiographical memory was defined as a memory of a personally experienced event that came to my mind with no preceding attempts at retrieval. This definition did not exclude the possibility that – in retrospect – specific parts of the current situation might be identified as cues for the memory. Also, both specific episodes (one-time occasions) and summarized events (i.e., a condensed representation of many similar occasions, cf., Barsalou, 1988) could be recorded. Initially, I defined my own task as to record all involuntary autobiographical memories that possibly occurred during a period of six months. However, because I had considerably more than expected, I stopped recording after seven weeks when I had reached a total of 100 records.

In an earlier short-term pilot study, I had observed that involuntary memories were rapidly forgotten if not recorded at once. For that reason, recording was divided into two steps. Immediately when an involuntary memory had occurred, I entered keyword phrases in a small notebook that I had instructed myself to carry at all times. Later the same day, I answered a more extensive questionnaire about

each memory, assisted by the keyword phrases in the notebook. The keyword phrases in the notebook served to retain characteristics of the current situation as well as characteristics of the memory.

Further, if one or more memories were additionally brought to mind while the first memory was being recorded in the notebook (so that the additional memories appeared to be triggered by the first one) these were also recorded in the notebook. In the following, such additional memories are termed successive recollections.

At the end of the day, I answered the extensive questionnaire about each involuntary autobiographical memory recorded in the notebook during the day. Among other things, I described what I had been doing, what I had been thinking about, and how I had been feeling (physically and emotionally) right before the memory came to mind. I also gave a detailed description of the memory. In order to investigate whether the memory was cued by features of the retrieval context, I examined whether any salient commonalities could be observed between the situation in which the memory had come to mind and the content of the memory. Nine categories for commonalities were offered on the questionnaire (sensory experience, person, activity, object, place, wording, theme, feeling, and other). More than just one of these could be checked. Age of the memory was noted in years. If the event had taken place within the most recent year, the month was indicated as well. Vividness of the memory and frequency of prior rehearsal were rated on five-point scales. If the memory had been followed by successive recollections, these were described on the same questionnaire. Salient commonalities between the first memory and each of the successive ones were listed. Age of memory and rehearsal of each of the successive recollections were also entered.

Results

The frequency of involuntary autobiographical memories was surprising. They were certainly not an unusual or exceptional phenomenon. Instead, my problem was that on some days, it seemed

almost impossible to record all the memories that spontaneously came to my mind. On average, two involuntary autobiographical memories were recorded each day (ranging 1–6). Subsequent diary studies involving undergraduates (e.g., Berntsen, 1996) has shown that this level of frequency is quite typical. In short, involuntary autobiographical memories are common in daily life (see also Chapter 4). In addition, while I entered keyword phrases in the notebook, 68 of the 100 memories were followed by additional recollections. The total number of such successive recollections was 169 (ranging 0–13 per target memory). The following account will focus on the first memories, unless otherwise specified.

The great majority (almost 90 percent) of the involuntary memories had identifiable cues in terms of salient commonalities between the current situation and the remembered event. Often more than just one commonality was recorded. The most common cues were sensory experiences and other people. Among the sensory experiences, the most dominant modalities were vision and sound. The cues appeared to be mostly features of the external world, whereas purely internal cues (such as feeling states) were rare. As we shall see in Chapter 5, the dominance of external cues has been found consistently in diary studies on involuntary autobiographical memories. It shows that the content of these memories to a large extent is shaped by the personal environment of the individual. Metaphorically, one might say that the lives we have lived have left traces and marks in our environment that subsequently serve as cues for our personal memories.

In cases where successive recollections followed, distinguishable cues for the successive memory could be identified in terms of noticeable overlaps in content with the first memory. In particular, the successive recollections often dealt with the same person as the first memory and were temporally close to the first memory.

However, not just the available cues influenced which kind of memories came to mind. Characteristics of the remembered event themselves appeared to add constraints on their activation. In

particular, recent events were dominant. More than 40 percent of the memories stemmed from the most recent year. A similar recency effect was found when age of memory was measured in months for memories that dealt with events from the most recent year. This dominance of recent events is consistent with what we know about forgetting more generally (Rubin and Wenzel, 1996). However, memories from within the recent year did not simply follow a normal forgetting curve in my case. They tended to cluster around the time of a highly significant personal event – the sudden death of a close friend – which had taken place some months before the diary period. In general, a substantial number of memories (21 percent) had some reference to this upsetting event by dealing with past experiences involving this friend. As we shall see in Chapter 5, similar effects of stirring events have been observed in later diary studies with undergraduates, although when collapsed across many people, memory frequency by time follows a standard forgetting function (see Chapter 4).

A pronounced dominance of specific events was found. This dominance was surprising, since I had allowed myself to record both specific and summarized events and since other studies had shown that people often erroneously recall summarized events when they are explicitly instructed to record only specific episodes (e.g., Barsalou, 1988). This finding therefore could suggest that the frequency of specific episodes varies as a function of whether retrieval is voluntary or involuntary. As we shall see in Chapter 6, this has been confirmed in later studies.

Contrary to the prevalent idea that involuntary recall yields privileged access to emotionally negative experiences (e.g., van der Kolk and Fisler, 1995), no differences were found in the frequency of emotionally positive and emotionally negative events in the present study. As I will show in Chapter 4, the general finding in fact is a clear dominance of emotionally positive relative to negative memories. The absence of this positivity bias (Walker, Skowronski, and Thompson, 2003b) in the present study could be due to the influence of the negative stirring event just mentioned.

The majority of the memories were rated vivid, consistent with artistic accounts of involuntary autobiographical memories. For example, Salaman (1982) claimed that involuntary recollections often brought back past moments so vividly that it seemed as if they were happening right now. Salaman's claim was probably not intended to be accepted at face value, since this would seem to require involuntary autobiographical memories to be as vivid and accurate as the original perception. Rather, she hinted at an ability of involuntary memories to strongly influence the current emotional state of the remembering person and cause a strong identification with a past self. Sometimes, the involuntary memories indeed affected my mood in noticeable ways. In some especially powerful cases, I spontaneously described this impact on the response sheet, but I did not record the mood impact systematically. Consequently, the present study did not tell how common this impact was nor whether it was consistent with the emotional content of the remembered event. Such questions were therefore also left for subsequent studies. As we shall see in Chapter 6, involuntary autobiographical memories generally have a stronger ability to influence the person's mood than memories recalled voluntarily.

Forty percent of the memories were rated as often thought about before, whereas roughly a quarter were seen as "never" thought about before. Most of these rarely rehearsed memories referred to recent events. However, a few of them referred to very remote events, and thus had the Proustian quality of bringing back a "dormant memory" – i.e., a vivid memory apparently not thought about for years (see Chapter 2).

In one particularly noticeable case I was sitting in my office at work. It was a dark November afternoon. The light was dim and the computer was making its monotonous noise in the background. Nelson-Goodman's *Languages of art* was lying open on my desk in front of me. I was reading while eating my lunch. I had brought a clementine for my dessert and while I was peeling it, I suddenly remembered a scene that I felt I had not thought about for many

years. This was a scene from my many visits to my grandmother while I was growing up. She lived in the same village and each day in the afternoon I went to her house to bring her a newspaper that she shared with my parents. The scene I suddenly remembered was the following: during a certain period it had become almost a tradition that she handed me a clementine when I arrived. Sitting in my office, I suddenly remembered myself standing by her dark wooden dining table, peeling the clementine that she had just handed me, and putting the peels into a blue ceramic ashtray (a souvenir from a small Danish island). She is sitting in her armchair watching me. Her comment was always the same: "Well, I would be just as happy to offer you a piece of chocolate, but I know you don't like it." This was far from true, but it was nonetheless the impression I had tried to leave on my surroundings at the time. I was fourteen or fifteen years old and wanted to avoid candy – not because I did not like it, but because I wanted to live a healthier life and lose weight. The tone in her voice was respectful and understanding. It was a day with sunshine and the warm light was coming in through the windows, all facing south.

What was special about this memory was its extreme vividness, together with my conviction that I had not thought about this particular scene since it took place many years earlier. Also, a multitude of other recollections of her place followed in its wake. For some minutes, it seemed as if I suddenly remembered "everything" in my grandmother's house, and for a while I did nothing but make notes about all the details from her home that flooded my mind. I remembered the yellow curtains, the lampshade of mixed shades of grey, the bookshelves with black and white family photographs, the telephone directory hanging on the wall next to her chair, the brown dress and cardigan that she was wearing, and how in the wintertime when she walked me home, I always turned on the light in the hall while she turned off the light in the kitchen on her way out. I remembered the peculiar light switch, a knob that had to be turned around for the light to go out . . . Sitting in my office with the peels

from the clementine on a napkin, I wrote detail after detail, feeling as if I suddenly had been brought back to my grandmother's house for an unexpected last visit many years after her death.

I had other memories of my grandmother coming back to me during the diary period, but none as vivid and moving as the one activated by the clementine. This was my only truly "Proustian" memory. Such involuntary autobiographical memories are rare (in my case it was one out of a hundred). By conducting the diary study I learned both that they may occur and that involuntary autobiographical memories in general are much more mundane and indeed possible to study in a systematic way without having to wait very long for their occurrence (in contrast to Miller's [1962] worry). In Chapter 6 I will provide a more thorough discussion of such rare Proustian involuntary memories.

In summary, the diary method appeared to work well. The division of recording into two steps (keyword phrases in a notebook followed by a more detailed questionnaire later the same day) proved especially useful. It enabled recording to take place immediately when the memory came to mind. This was important both in order to remember the content of the memory and to detect possible memory cues. The noting of initial keyword phrases took little time and provided good support for answering the questionnaire at the end of the day. I also learned that in future diary studies, the subjects should not be required to record all their involuntary memories. It seemed that involuntary autobiographical memories were too frequent for this design to be appropriate. In most subsequent studies, I therefore restricted my participants to recording only the first two involuntary autobiographical memories that might occur each day.

The data in the present study derived from a single person. In principle, all of the findings could be a peculiarity of this person's memory. Notably, my personal and professional interest in involuntary autobiographical memories could have contributed to their

observed frequency. My interests and ideas might unconsciously have generated the kind of memories I was looking for. However, in the following chapters, we shall see that many studies conducted later with independent participants were largely consistent with these early findings.

4 **How special are involuntary autobiographical memories?**

There are also compelling reasons to conclude that the mechanisms underlying standard measures of recall and recognition are distinct from the mechanisms underlying involuntary memories.

(Brewin, 2005, pp. 145–6)

“Special, but not so special” is the ironic title of an article on flashbulb memories (Christianson, 1989). The same phrase expresses a relevant characteristic of involuntary autobiographical memories. They are special in some regards, as I will show in Chapter 6. However, they are not so special that they should be explained in terms of their own memory system or in terms of memory mechanisms that pertain only to them. Not all theorists share this view. On the contrary, some researchers argue that involuntary autobiographical memories are governed by processes that are fundamentally different from processes normally characterizing memory, as illustrated by the quotation from Brewin (2005) at the beginning of the chapter.

Some researchers with a psychodynamic outlook on involuntary autobiographical memories have pursued the view that involuntary memories are primarily a medium for traumatic or stressful material (e.g., Brewin, 2005; Ehlers *et al.*, 2004; Horowitz, 1986; van der Kolk and Fisler, 1995; see also Chapter 2). Although these researchers have presented different theories, as we shall see in Chapter 7, a common assumption is that involuntary memories reflect the operations of a special memory system, such as “an active memory storage” dedicated to the processing of unresolved stressful events (Horowitz, 1986), or a memory system for emotional material that can be accessed only through situational cues (Brewin *et al.*, 1996b; Brewin and Holmes, 2003).

In this and the following chapters, I will advocate a different view (see also Chapter 2). The essence of this view is that involuntary autobiographical memories differ from their voluntary counterpart simply with respect to the way they come to mind. The main difference in this regard is that involuntary memories are activated with no preceding goal-directed search and with no search description. Because the two different retrieval processes vary in terms of their efficacy in activating certain types of content, this entails certain differences in the content and qualities of the two kinds of memories, as I will argue in Chapter 6. As these differences can be explained as a byproduct of the dissimilar retrieval processes, they do not imply that the content of involuntary memories is encoded or maintained in ways that are fundamentally different from the encoding and maintenance of voluntary memories. This is counter to what is assumed by theorists arguing that involuntary autobiographical memories reflect the operations of a special memory system or distinct memory mechanisms, dedicated to the processing of certain types of information that will often be hard, maybe impossible, to access through voluntary recall (e.g., Brewin and Holmes, 2003; Ehlers and Clark, 2000). If this were the case, we should expect to see marked differences between involuntary and voluntary autobiographical memories with respect to factors showing the most basic and systematic effects on encoding and maintenance of autobiographical memory, such as event age, rehearsal, and emotion. In the present chapter, I will show that involuntary and voluntary autobiographical memories follow largely the same pattern with regard to such factors. Although more research should be done, the available evidence clearly suggests that involuntary and voluntary autobiographical memories have the same basic properties with regard to encoding and maintenance, counter to the idea that they reflect the operations of two different memory systems. The findings agree well with the present view that the two types of autobiographical memory reflect different retrieval mechanisms operating on the same episodic memory system.

Chapter 5 deals with how involuntary autobiographical memories come to mind, and thus what the distinct mechanisms characterizing their retrieval are. Following up on these findings, Chapter 6 will address how important differences between the two kinds of memories can be a byproduct of their different mechanisms of retrieval. In particular I review differences regarding specificity and distinctiveness of the remembered events as well as emotional reactions at the time of recall. Some of these retrieval-related differences are also important for our understanding of involuntary memories after traumatic events, which I will discuss in Chapter 7.

ENCODING- AND MAINTENANCE-RELATED FACTORS

If involuntary autobiographical memories show the same basic pattern regarding encoding and maintenance as their voluntary counterpart, then their accessibility should be shaped by the same factors as voluntary autobiographical memories. In a general sample of involuntary autobiographical memories, we therefore should expect a high frequency of recent events (Rubin and Wenzel, 1996), few, if any, memories from the first years of life (e.g., Pillemer and White, 1989; Usher and Neisser, 1993), and, for people over age forty, a high frequency of positive events referring to young adulthood (Berntsen and Rubin, 2002). We should also expect a dominance of emotionally intense events (e.g., McGaugh, 2004) and emotionally positive events (Walker *et al.*, 2003b). Memories of frequently rehearsed events should be more likely to come to mind involuntarily than less rehearsed memories. In the following, I will show that involuntary memories follow the same basic pattern as voluntary memories with regard to these issues.

Distribution of memories across life

Numerous studies on voluntary autobiographical memories document that these are not evenly distributed across the life span. Instead, events from some periods of our life tend to be more frequently remembered than experiences from other periods. Rubin,

Wetzler, and Nebes (1986) reanalyzed data from several studies on voluntary memories cued by words and argued that an adequate model of the distribution of autobiographical memory across the life span should contain three components: a retention function, the bump, and childhood amnesia.

A retention function is needed to account for the fact that frequency of reported memories decreases systematically with increasing time since the event took place. The decrease is steep in the beginning of the retention period, after which the curve evens out. This forgetting curve was originally pointed out by Ebbinghaus (1885) in his studies of memory for nonsense syllables and has been replicated numerous times (see Rubin and Wenzel, 1996, for an overview). However, the dominance of recent events are usually not seen when people are asked to report memories of their most important events or events that are highly vivid or most relevant to their life story (for a review, see Rubin, Rahhal, and Poon, 1998).

Consistent with research on voluntary (word-cued) memories, a clear advantage of recent events is found for involuntary autobiographical memories. Figure 4.1 represents data collapsed from two diary studies of involuntary autobiographical memories as well as voluntary memories cued by words that were included as a baseline measure in the two studies (Berntsen, 1998; Berntsen and Hall, 2004, study 1). Figure 4.1 shows that the forgetting curve for the involuntary memories and their voluntary counterpart is highly similar. Both distributions are best described in terms of a power function, accounting for 95 percent of the variance for both types of memories, with a minor difference in the slope of the involuntary ($-.98$) versus voluntary ($-.81$) memories.

Clearly, for both types of memories, a marked dominance of recent events is found. Around 40 percent of the memories refer to events that have taken place within the most recent year. In one of the two studies (Berntsen and Hall, 2004), we asked our participants to also specify the retention time in months if the reported memories had taken place within the most recent year. No difference between

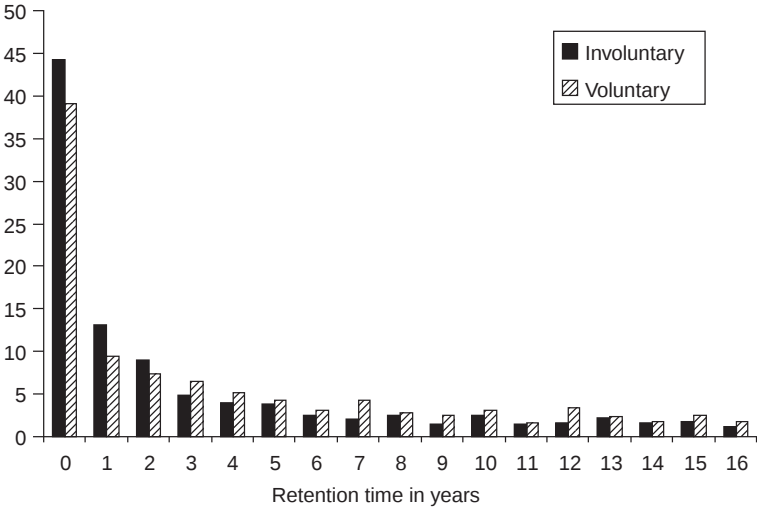


Figure 4.1. Percentage of involuntary and voluntary autobiographical memories as a function of their retention time. Only memories with retention time of less than seventeen years are included. N for voluntary = 1,266, N for involuntary = 1,401. Combined data from Berntsen (1998) and Berntsen and Hall (2004).

involuntary and word-cued memories was seen regarding the time distribution for this subset of memories. Both showed a marked recency effect, in that in both cases roughly 60 percent referred to events that had taken place within the latest month and around 40 percent referred to events from the most recent week. Because memory frequency as a function of time is a measure of how accessibility declines as time passes, these findings are consistent with the claim that involuntary and voluntary memories do not differ in how they are maintained over time.

The second component of the distribution of voluntary autobiographical memories across life is an increase in memories from the second and third decades of life, compared to the surrounding periods. This phenomenon – which is clearly visible only among people over forty – was discovered by Rubin, Wetzler, and Nebes (1986) in a reanalysis of data from several studies on word-cued autobiographical memories. Rubin *et al.* simply termed this phenomenon “the bump.”

The bump has now been found in many studies using a variety of ways of probing voluntary autobiographical memories. In addition to word-cued memories, it has been found to be even more pronounced when people are asked to recall their most important memories, their most vivid memories, or memories that they would include in their autobiography, and so forth (see Rubin *et al.*, 1998, for a review). Interestingly, the bump is not found when people are asked to recall highly negative events from their life, whereas it is consistently found for highly positive events (Berntsen and Rubin, 2002; Rubin and Berntsen, 2003).

Because the bump is seen only with middle-aged and older adults, data on involuntary memories from diary studies with undergraduates are of little use here. To explore the distribution of involuntary autobiographical memories among older people, we (Berntsen and Rubin, 2002) asked a large sample of Danes if they sometimes had personal memories that came to mind spontaneously. Most of our participants confirmed this. If they had experienced such memories, we asked them to think about the last time they had noticed a spontaneously arising memory and to indicate how old they were in the event in this memory and whether the event was happy, sad, or mixed. The results for participants above age fifty are shown in Figure 4.2. Consistent with findings on voluntary autobiographical memories, involuntary autobiographical memories show a bump, and as with voluntary memories, only for happy and mixed events, not for sad events. One limitation is that these data reflect retrospective assessments and therefore may have been biased to favor especially remarkable and surprising involuntary memories. However, in a diary study with older participants, Schlagman, Kvavilashvili, and Schulz (2007) similarly found a bump for involuntary autobiographical memories.

The third component that characterizes the distribution of autobiographical memories across life is childhood amnesia. This phenomenon refers to the finding that adults are generally unable to recall memories from the first three to four years of life and that

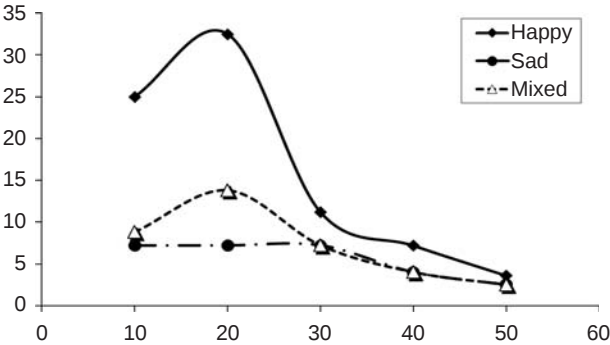


Figure 4.2. Frequencies of happy, sad, and mixed involuntary memories, age 0–50 for participants who are 50 or older. Redrawn from Berntsen and Rubin (2002, Figure 10).

memories for events that took place beyond the age of seven are usually sparse. The mean age of the person in the earliest childhood memories is consistently between three and four years of age (Fivush and Nelson, 2004). When plotting the frequency of more than 11,000 earliest memories recorded in more than twenty studies with a variety of methods, Rubin (2000) found that only 1 percent of the childhood memories from before age eleven referred to events in which the person had been less than three years old. After the age of three, a steep increase in the number of records was seen up to age seven, at which point the curve leveled out. A very similar distribution is seen for involuntary autobiographical memories recorded in diary studies. Figure 4.3 represents data collapsed from the two diary studies of involuntary autobiographical memories and word-cued memories that were used in plotting the forgetting curve in Figure 4.1 (Berntsen, 1998; Berntsen and Hall, 2004, study 1). Figure 4.3 shows the age distribution of the earliest memories reported in these studies. As illustrated, the two classes of memories show a similar pattern in that very few memories refer to events that took place before age three. This is followed by a steep increase up to age seven. There is another increase around age seventeen, which is likely to reflect a recency effect in this sample of young people. The distributions are a

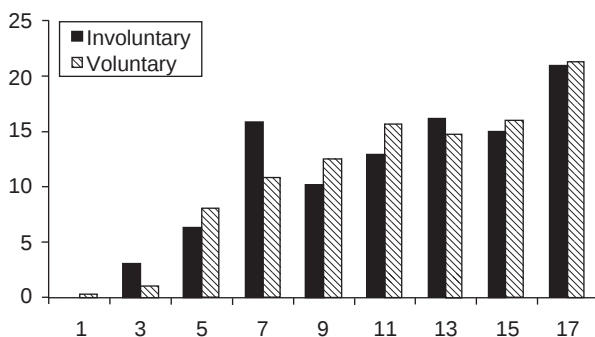


Figure 4.3. Percentage of involuntary and voluntary autobiographical memories as a function of the person's age at the time of the event. Only memories for events up to age eighteen are included. N for voluntary = 409, N for involuntary = 335. Combined data from Berntsen (1998) and Berntsen and Hall (2004).

bit noisy because there are relatively few early memories. Nonetheless, a clear childhood amnesia effect is seen for both memory types.

In summary, involuntary autobiographical memories show the same three characteristics regarding their distribution across life as do voluntary autobiographical memories. They show a forgetting curve with a marked dominance of recent events. As with voluntary autobiographical memories, their frequency decline over time is best described in terms of a power function. They show an increase of memories from young adulthood for middle-aged and older subjects, and they show childhood amnesia. For none of these characteristics were important differences identified between the involuntary memories and voluntary memories recorded as part of the same diary study or series of studies.

Frequency and rehearsal

Are involuntary memories of the personal past less frequent than voluntary memories? And what predicts involuntary versus voluntary recall of a certain event? David Rubin and I recently studied these issues by asking a large sample of the Danish population to think back upon either their Confirmation (a Christian religious rite

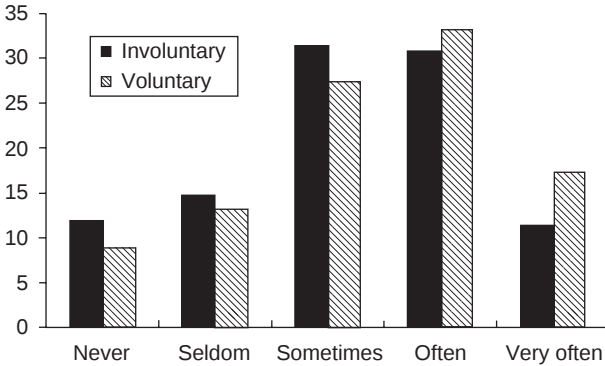


Figure 4.4. Estimated frequencies of involuntary vs. voluntary memories of an important event from the most recent week (percentages). Redrawn from Rubin and Berntsen (2008).

at age thirteen or fourteen that almost all Danes go through and celebrate with their family) or an important event from the last week (Rubin and Berntsen, 2008). They were then asked a number of questions about the memory. Among other things they were asked to rate on a five-point scale how frequently they had remembered the event voluntarily (“since it happened, I have willfully thought back to the event in my mind and thought about it or talked about it”) and involuntarily (“has the memory of the event suddenly popped up in your thoughts by itself – that is, without you having attempted to remember it”). Figure 4.4 illustrates the frequency estimates of having voluntary and involuntary memories for the recent event.

As can be seen, the frequencies for the two types of rehearsal were very similar for the same recent event. A similar pattern of results was seen for the Confirmation event (see Rubin and Berntsen, 2008). Thus, involuntary memories are not a rare occurrence. They appear to be as common in daily life as their much more studied voluntary counterpart.

In addition to the involuntary and voluntary memory question, the participants answered a number of other questions concerning the properties of the memories, such as their sensory imagery, degree of reliving, and life-story relevance. It was therefore possible to

examine which of these additional variables were the best predictors for the frequencies of involuntary and voluntary memories and, thus, whether the two types of memory recall had different or similar predictors. The results were very clear. Emotional intensity and life-story relevance were the best predictors for both involuntary and voluntary recall. This pattern of results was found for both the recent and the remote memory.

In order to further examine which encoding and maintenance factors are associated with involuntary rehearsal, I reanalyzed data from a number of previous studies that had examined autobiographical memories for emotional or otherwise important events in the participants' lives. Although these studies were conducted to examine voluntary autobiographical memories, all of them included a question probing how often the event had come to mind involuntarily (rated on five- or seven-point scales). It was therefore possible to see how well this involuntary memory measure correlated with measures of voluntary rehearsal, life impact, and retrospective ratings of emotional intensity at the time of the event (see Table 4.1).

As shown in Table 4.1, rehearsal and life impact consistently showed positive correlations with estimates of how often the event had come to mind involuntarily. Because rehearsal here refers to how often the event has been part of conversations, the uniform pattern of positive correlations between the rehearsal measures and ratings of involuntary memory frequency contradicts the idea that involuntary memories reflect the operations of a memory system for material that is not verbally accessible (e.g., Brewin *et al.*, 1996b) or the idea that the more you talk about a negative event, the less likely it is to bother you through involuntary recall (Harber and Pennebaker, 1992). Instead, the more these events were talked about, the more they also came to mind involuntarily. The positive correlations were found for both negative and positive events. This does not contradict findings showing that actively suppressing thoughts about a certain event may have the ironic effect of enhancing its accessibility through the so-called rebound effect (Wenzlaff and Wegner, 2000).

Table 4.1. *Frequency ratings of involuntary remembering correlated with ratings of rehearsal, intensity, and life impact*

Study and event	N	Rehearsal	Intensity	Life impact
<i>Berntsen (2002)</i>				
Study 2. Most shocking	113	.29*	.09	.40*
Study 2. Most happy	112	.39*	.12	.24*
Study 3. Most shocking	57	.40*	.19	.40*
Study 3. Most happy	56	.58*	.17	.51*
<i>Berntsen and Thomsen (2005)</i>				
Most positive	91	.56*	.35*	.38*
Most negative	108	.62*	.30*	.45*
Invasion day WWII	131	.72*	.24*	.37*
Liberation day WWII	125	.55*	.31*	.36*
<i>Bohn and Berntsen (2007)</i>				
Fall of Berlin Wall	162	.62*	.43*	.24*

Notes:
* $p < .05$
“Rehearsal” refers to frequency of talking about the event. “Life impact” refers to perceived extent of consequences.

However, this enhancement is found for both voluntary and involuntary recall, as reviewed in Chapter 2. Thus, again the two types of memories follow the same pattern.

Table 4.1 shows that emotional intensity correlates positively with frequency of involuntary memories in almost all of the studies. Berntsen (2002) shows only weak effects especially for study 2, which may reflect the use of a different involuntary memory scale and the fact that frequency estimates were given for the last month only, in combination with little variance in the intensity ratings. This positive relation between frequency of involuntary memories and emotional intensity of the remembered event agrees with the fact that

emotional arousal generally enhances memory accessibility (McGaugh, 2003, 2004, for reviews). We will dwell more on this question in the following.

Emotional content of involuntary and voluntary autobiographical memories

The relation between emotion and voluntary autobiographical memory shows two relatively stable characteristics. One is that memories with an emotional content are generally more accessible than neutral memories. This is sometimes called the intensity bias. It has been found in diary studies examining memory for naturalistic events (Holmes, 1970; Thompson, *et al.*, 1996) as well as in laboratory studies (e.g., Bradley *et al.*, 1992; Dolcos, LaBar, and Cabeza, 2004, 2005; Reisberg *et al.*, 1988). The second characteristic is that memories for positive events seem to be more accessible than memories for negative events. As with the intensity bias, the bias in favor of positive events has found support in many studies (see Matlin and Stang, 1978; Walker *et al.*, 2003b, for reviews). In the following I will show that the same two characteristics apply to involuntary autobiographical memories.

Intensity bias It is well-documented that emotional arousal during learning enhances subsequent memory (e.g., McGaugh, 2003, for a review). One likely explanation is that the consolidation of the memory is enhanced through the release of stress hormones, which in turn causes the release of norepinephrine within the amygdala in the brain, which has been found to improve memory consolidation. Although this explanation was developed on the basis of research with animals, it has been supported by studies involving human subjects (Cahill and Alkire, 2003; Cahill, Gorski, and Le, 2003). In addition, the intensity bias in autobiographical memory may also reflect the fact that personal events with an emotionally intense content are usually more distinctive, and also, for that reason, more memorable than neutral events (Hunt and Worthen, 2006). Once a highly

accessible memory has been formed as a result of such encoding and consolidation mechanisms, increased rehearsal in conversations and in thoughts may further contribute to long-term maintenance.

The advantage of memories for emotionally intense events has been shown in studies measuring accuracy (e.g., Yuille and Cutshall, 1986) and subjective reliving qualities (e.g., Talarico, LaBar, and Rubin, 2004). All of these studies have been conducted with memories that were voluntarily retrieved. Is the intensity bias also found for involuntary autobiographical memories? In a diary study of involuntary memories and voluntary word-cued memories (Berntsen and Hall, 2004), we asked the participants to rate how emotionally intense the remembered events were when they took place. We found no differences between the two kinds of memories regarding the intensity ratings. Reanalysis of the data revealed that for both kinds of memories, more memories were rated high than low on the scale for emotional intensity. Thus, involuntary and voluntary memories both showed the expected intensity bias. We found a similar relative dominance of memories rated as highly intense in a recent diary study on involuntary *recurrent* memories – that is, involuntary memories that appear to come to mind repeatedly (Berntsen and Rubin, 2008).

One limitation of this type of work is that ratings of emotional intensity are done retrospectively. To remedy this problem, Nicoline Hall and I conducted a follow-up laboratory study in which participants recorded their subjective emotional reactions while watching twenty upsetting negative pictures. After the participants had seen the pictures and recorded their reactions, they took part in a diary study of involuntary and voluntary memories. On each of five consecutive days they were to record a voluntary picture memory and the first involuntary picture memory that might occur on that day. The participants wrote brief keyword phrases of the memory content which allowed us to afterwards identify which pictures they had recorded as voluntary versus involuntary memories in the diary. For both kinds of memory, we found a clear intensity bias: pictures the participants remembered were rated as more upsetting and more

emotionally intense during encoding than pictures they did not record in the diary study. This effect was equally strong for voluntary and involuntary memories (see Hall and Berntsen, 2008, for details).

Intensity bias

In a review of findings concerning the emotional content of autobiographical memories, Walker *et al.* (2003b) report a consistent dominance of positive relative to negative memories. Across different studies, roughly twice as many positive than negative memories are recorded. The number of negative memories typically does not differ from the number of memories rated as neutral. Although some variation is seen across different studies, the general pattern appears to be that roughly 50 percent of the recorded memories are deemed positive, 25 percent negative, and 25 percent neutral. This pattern is also found in studies where the participants are asked to record the emotional valence at the time of the event so that the assessment of the emotional content does not rely on retrospection during the memory test.

According to Walker *et al.* (2003b) there are two reasons for this positivity bias. One is that people under normal circumstances perceive more events as positive than negative, which agrees with the fact people in general are in a positive mood more frequently than in a negative mood. The other is what Walker and colleagues have coined the “fading affect bias.” This notion refers to the observation that affect associated with emotionally negative events fades more quickly in memory than affect associated with positive memories (Holmes, 1970; Walker, Rodney, and Thompson 1997).

If the accessibility of voluntary and involuntary autobiographical memories is shaped by the same constraints, we should expect positive involuntary memories to be more frequent than negative involuntary memories in a normal population. This is what we find. Table 4.2 shows the frequency of involuntary and voluntary memories rated as positive (“1” or “2” on five-point rating scales),

Table 4.2. Frequencies (percentages) of involuntary and voluntary memories rated as positive, negative, or neutral

Study	Positive		Negative		Neutral		Pos > neg	
	Involuntary	Voluntary	Involuntary	Voluntary	Involuntary	Voluntary	p<	
2004 ¹	47	49	30	26	23	25	.0001	
1998 ²	49	41	19	30	32	29	.0001	
2001 PTSD ³	40	-	39	-	21	-	.9	
2001 Peak ⁴	50	-	30	-	20	-	.05	

Notes:

¹ Berntsen and Hall (2004, study 1); ² Berntsen (1998); ³ Berntsen (2001, study 2); ⁴ Berntsen (2001, study 4)

negative (“−1” or “−2” on five-point rating scales) or neutral (“0” on five-point rating scales) in four diary studies. Two of these studies (Berntsen, 1998; Berntsen and Hall, 2004) included a voluntary condition as well, whereas the remaining two did not. Berntsen (2001, study 2) was a diary study conducted with students showing symptoms matching the formal criteria for PTSD according to the DSM-IV (American Psychiatric Association, 2000). Berntsen (2001, study 4) involved students who had encountered an extremely positive event (sometimes called a peak experience, see Maslow, 1959) that had exerted a major impact on their life and outlook. Overall, Table 4.2 shows a substantial dominance of emotionally positive memories relative to negative memories. This dominance is present for both involuntary and voluntary memories.

The students with a PTSD-symptom profile (Berntsen, 2001, study 2) form an exception. In this group an equal number of positive and negative memories were recorded (see Table 4.2). One might suggest that the absence of a positivity bias among the participants with PTSD symptoms simply reflects the fact that their traumatic memory repeatedly came to mind and thus was recorded over and over again in the diary. However, this was not the case. In fact, the event that the participants had nominated as their trauma and for which they had rated their PTSD symptoms (see Berntsen, 2001, for details) only accounted for 5 percent of the total memory records. On the other hand, the participants recorded a substantial number of memories that did not directly refer to the traumatic event but for which the participants nonetheless perceived a connection to the trauma, such as a thematic similarity or a causal connection. One possible explanation for the lack of a positivity bias among these individuals therefore might be that the traumatic event (despite the fact that it accounted for only 5 percent of the records) had formed a central reference point for the interpretation of other experiences, so that other (non-traumatic) events had become associated with the negative emotionality of this event. Elsewhere we have showed that the extent to which traumatic memories form reference points for

the understanding of other experiences is positively associated with PTSD symptoms and depression (Berntsen and Rubin, 2006a, 2006b, 2007). I will follow up on this as well as the issue of recurrent trauma memories in Chapter 7.

To pursue the findings in Table 4.2 a little more: because I did not include a voluntary baseline in the study with participants with PTSD symptoms (Berntsen, 2001, study 2), this study does not clarify whether the deviation from the normal dominance of positive events applies specifically to the participants' involuntary memories or whether it would also be found if their voluntary memories had been examined as well. However, other studies suggest that it most likely would hold also for voluntary memories. It is well documented that dysphoric and depressed individuals have a harder time accessing positive memories through strategic recall, both when measured in terms of latencies and memory frequency (see Williams, 1992, for a review). Also, their negative voluntary memories do not fade more quickly over time than their positive voluntary memories, contrary to what is the case for non-depressed (Walker *et al.*, 2003a). The absence of a positivity bias in depression seems to be a mood-state-dependent effect rather than reflecting the possibility that depressed people have lived less happy lives. In a study of clinically depressed patients who showed diurnal variation of mood, Clark and Teasdale (1982) found that the patients recorded more negative than positive voluntary memories in response to cue words when they were in a depressed mood state, whereas the picture reversed when they in a more positive state.

Following these findings, it makes sense that the students with a PTSD-symptom profile (see Table 4.2) failed to show a positivity bias in their involuntary memories. Most likely, a sample of their voluntary autobiographical memories would have shown a similar pattern. This was confirmed in a recent study. American undergraduates who had scored either high or low on a scale for PTSD symptoms recorded both involuntary and voluntary memories in an electronic diary. As predicted, participants with a high level of PTSD

symptoms recorded more negative memories than participants low on PTSD symptoms. This effect was uninfluenced by whether the memories were involuntary or voluntary (Rubin, Boals, and Berntsen, 2008b).

In short, except for samples with symptoms of depression and PTSD, we find a clear dominance of positive events for both voluntary and involuntary memories. For both kinds of memories, the ratios of positive/negative events are quite similar to the 2:1 ratio reported in Walker *et al.* (2003b) review (see also Schlagman, Schulz, and Kvavilashvili, 2006).

Some researchers have instructed their participants to pay special attention to certain classes of involuntary memories or even limit the recording to involuntary memories with a negative emotional content. As one would expect, in such studies a positivity bias is usually not found. Brewin, Christoulides, and Hutchinson (1996a) obtained an equal number of positive and negative involuntary memories when they asked their non-depressed participants for “their five most frequent intrusive memories from the past two weeks” (p. 108). Unlike “involuntary,” which is a neutral term with respect to emotional valence, “intrusive” implies unwanted and therefore seems to have negative connotations. Moreover, participants were told as part of the instructions that intrusive memories “may be difficult to control, hard to mention or even embarrassing” (p. 108). Using the same instructions, Bywaters, Andrade, and Turpin (2004) found a dominance of pleasant intrusive memories among non-depressed students and a dominance of unpleasant intrusive memories among depressed students. Brewin *et al.* (1998) studied the frequency of intrusive memories with a negative emotional content among cancer patients who were either severely depressed, mildly depressed, or not depressed. They found that 43 percent of the severely depressed reported negative involuntary memories, against 32 percent of the mildly depressed and 11 percent of the non-depressed participants. Because the participants were limited to reporting involuntary memories with a negative content, the

increased frequency of such reports as a function of severity of depression agrees well with what we know about autobiographical memory in depression in general (see also Chapter 7). In such groups we find a deviation from the normal dominance of positive autobiographical memories. The important point here is that this is true for both voluntary and involuntary memories. It is not a characteristic of involuntary autobiographical memories in particular.

SUMMARY

Involuntary autobiographical memories show the same distribution across the life span as voluntary memories in terms of a marked dominance of memories from the recent past, hardly any memories from the first two to three years of life, followed by a steep increase up to age seven. For participants above age forty, a bump in young adulthood is seen for involuntary memories, similar to what has been observed for voluntary memories. Involuntary autobiographical memories also show the same pattern regarding emotion as their voluntary counterparts. For both kinds of memories, emotionally intense events are more likely to be remembered than emotionally less intense events, and memories for positive events are more frequent than memories for negative events among non-depressed people.

The findings do not support the psychodynamic view that involuntary memories are biased toward emotionally negative material or in other ways differ from voluntary autobiographical memories regarding mechanisms related to encoding and maintenance. In other words, the findings reviewed in the present chapter leave the impression that there may be very little special about involuntary memories. However, this is not really the case. In the next two chapters, I will provide evidence that involuntary autobiographical memories are different from their voluntary counterparts in some important respects. As I will show in Chapter 6, involuntary autobiographical memories differ from voluntary memories on dimensions that have to do with their specificity, life-story

relevance, and emotional impact at recall. I will argue that these differences are a consequence of the way involuntary memories come to mind. In the next chapter, we will therefore examine the mechanisms that bring involuntary memories to mind, before moving on to a discussion of retrieval-related differences in Chapter 6.

5 How do they come to mind?

We see a star in the sky if its light reaches our eyes and *if* there is no light reflected from the sky around it. We understand a spoken message if we hear a certain set of sound stimuli and *if* we know the language in which it is spoken. Similarly we remember an event if it has left a trace and *if* something reminds us of it.

(Tulving, 1974, p. 74)

This chapter deals with what may be considered as the most intriguing question in relation to involuntary autobiographical memories, namely, how and why they suddenly come to mind. However, some of the challenges associated with this question are not limited to this class of memories. The theoretical problem of how an unconscious state (i.e., an event stored in memory) may at a certain time attain the quality of consciousness, so that we can subjectively relive and re-experience it, of course also pertains to memories that are recalled voluntarily. Voluntary retrieval is often described as a cyclic process, beginning with a search description that specifies the to-be-remembered information in response to a retrieval request (e.g., where did I put my keys?) and gradually narrows in on a set of alternatives, until we think we have found the right answer (Norman and Bobrow, 1979). One puzzle in relation to involuntary memories is how such circling in can take place without an initial search description and without a goal-directed search process.

In this chapter I will show that most involuntary autobiographical memories have identifiable cues in terms of some fairly distinctive similarity between the memory and the situation in which it comes to mind. However, finding that most involuntary autobiographical memories have cues still leaves many questions unanswered. To illustrate, in Chapter 3 I described how the act of peeling a clementine in my office was followed by a surprisingly vivid involuntary recollection of a scene in my youth in which my

grandmother offered me a clementine. At a first glance one might simply suggest that the memory was “triggered by the clementine.” However, for various reasons, this is not a very satisfactory answer. First, was the occasion with my grandmother the only time in my past that I ever had a clementine? Of course not, and I should therefore have plenty of memories involving clementines. Then how was this particular clementine memory chosen over the other candidates? This question is related to Tulving’s (1974) distinction between accessibility and availability – that is, an item may be stored in memory (and thus available) without being accessible for the time being. It also deals with the related principle of cue overload, which refers to the observation that “the efficiency of a functional retrieval cue in effecting recall of an item declines as the number of items it subsumes increases” (Watkins and Watkins, 1975, p. 443). In other words, if a cue is related to many items stored in memory, it will not be a very efficient cue for any of them, whereas a cue associated with only one item will be a very efficient cue for this particular piece of information.

Second, why was peeling the clementine followed by the activation of a memory, whereas the noise from my computer was not, nor the sight of my old beat-up pencil case on the desk, my coffee cup, sounds from the corridor, sentences in the book I was reading, and so forth? Since these features are highly likely to have overlapped with parts of past events as well, why did they not bring any memories to mind in this particular situation? This second question addresses how cues are unconsciously singled out. This is not an issue in traditional cued recall experiments, in which the cues and items to be recalled are usually paired by the experimenter in advance. Nor is it an issue in autobiographical memory studies using word cues chosen by the experimenter. However, with involuntary memories in naturalistic settings, the number of potential memory cues seems almost endless, for which reason it becomes an issue why some features, and not others, are followed by a conscious memory in a given situation (Mandler, 2007). Merely identifying cues in terms of

overlaps between the memory content and the recall context does not solve these problems. In order to address them, we have to also examine possible memory accessibility constraints (such as recency and emotion) that favor the activation of some memories over others (e.g., Tversky and Kahneman, 1973), and we have to consider attentional biases that render some potential memory cues more salient than others at a particular time. It is also relevant to consider what experimental memory psychologists have called cue-item discriminability, referring to how easily a given cue can discriminate an item in memory (Rubin, 1995). All of this will be addressed in the following. We will first examine what kind of cues precede the activation of involuntary autobiographical memories. We will next address attentional and motivational constraints for their activation, and how such factors may interact with cuing via association. By the end of the chapter, I will discuss possible reasons for why we are not constantly flooded by involuntary autobiographical memories.

CHARACTERISTICS OF THE CUES

In most diary studies, participants have been asked to report possible cues for the memories and to classify these as external (present in the physical surroundings), internal (only present in thoughts), or mixed (a combination of external and internal features). Berntsen (1996, 2001) and Berntsen and Hall (2004) asked participants to report any salient commonalities that they perceived between the memory and the retrieval situation, whereas Mace (2004) and Schlagman *et al.* (2007) simply asked their participants to identify and describe what they thought had triggered the memory. Schlagman *et al.* did not include an option to endorse a mixed cue category. In spite of these differences, the results are quite similar. As shown in Table 5.1, specific cues could be identified for the great majority of the memories (see Ball and Little, 2006; Kvavilashvili and Mandler, 2004; Mace, 2005, for similar results regarding involuntary autobiographical memories but without the categories of Table 5.1). This is not a

Table 5.1. *Percentages of involuntary memories with external, internal, mixed, and no identifiable cues in diary studies of involuntary memories*

Study	External	Internal	Mixed	None	N
Berntsen (1996)	37	24	32	7	695
Berntsen (2001, study 2)	44	15	31	11	600
Berntsen (2001, study 4)	43	26	20	10	700
Berntsen and Hall (2004)	46	23	17	14	758
Mace (2004) ¹	44	33	13	10	811
Schlagman <i>et al.</i> (2007) ²	55	22	–	23	224

Notes:

¹ Recalculated from Mace (2004); ² Schlagman *et al.* (2007) did not include an option for mixed cues.

N refers to number of memories.

trivial finding. In a study of involuntary semantic memories (e.g., words and fragments of sentences unexpectedly coming to mind), Kvavilashvili and Mandler (2004) found that only 37 percent came to mind in response to identifiable cues against 80 percent for the involuntary autobiographical memories recorded in the same study. This suggests that the dependency of concrete cues matching particular parts of the memory content is a distinctive characteristic of involuntary autobiographical memory.

In all studies shown in Table 5.1, external cues are more frequent than internal cues.¹ Thus specific features of the environment are more frequently experienced as triggers for involuntary autobiographical memories than features of thoughts and emotions. Because we do not control the large majority of stimuli that we encounter in our external environment in daily life, the relative dominance of

¹ I should like to take the opportunity to correct a mistake in an earlier review (Berntsen, 2007) in which I erroneously noted that Mace (2004) formed an exception to this pattern.

external cues underscores the accidental nature of involuntary autobiographical memories.

To learn more about the nature of the cues, we (Berntsen, 1996, 2001; Berntsen and Hall, 2004) instructed our participants to classify the commonalities that they had perceived between the memory and the retrieval context according to categories that had proved meaningful in my pilot studies (cf., Chapter 3). The frequencies are shown in Table 5.2. The four columns in this table correlate well with one another (r s ranging .58–.91), showing that a relatively similar pattern in the frequencies of the cue categories is seen across the four studies. The most dominant cue categories are specific objects, activities, people, and themes (including both themes related to the person's life and non-personal themes, e.g., election to the European Parliament). Pure sensory experiences (e.g., a smell) are relatively infrequent. This latter observation agrees with findings reported by Mace (2004) and Schlagman *et al.* (2007). In one of my studies (see Berntsen, 1999), I analyzed seventy-three cases triggered solely by sensory cues. I found that 43% had auditory cues (typically pieces of popular music), 21% were visual, 10% were tactile, 10% gustatory, 8% olfactory, 7% somatic, and 3% kinaesthetic. Thus even among cues categorized by the subjects as purely sensory, the frequency of so-called Proustian cues (i.e., smell, taste) is low.

The finding that most involuntary autobiographical memories have cues in terms of specific similarities between the retrieval situation and the content of the memory agrees very well with the encoding specificity principle (Tulving and Thomson, 1973) according to which an episodic memory cue is effective only if it was encoded together with the to-be-remembered item of information.

Morton (1990) suggested that features triggering involuntary memories are often features that were in the background for the remembered event and thus irrelevant to the actual content of the memory. However, this would seem at odds with the encoding specificity principle stating that "the probability of successful retrieval of the target item is a monotonically increasing function of

Table 5.2. *Frequency of mention as a salient commonality between a memory and its retrieval context for each cue category (percentages calculated on the basis of total number of cues)*

Category	Berntsen and Hall (2004) N = 871	Berntsen (2001: 2) N = 862	Berntsen (2001: 4) N = 927	Berntsen (1996) N = 875
Object	17.0	17.1	18.7	15.8
Theme*	22.1	16.2	16.5	12.8
Activity	10.4	13.8	13.1	19.2
Person	12.7	10.9	13.1	15.8
Location	10.6	11.8	8.2	9.0
Sensory	9.9	10.3	9.8	9.8
Feeling	6.8	9.3	7.6	10.7
Wording	4.7	5.2	6.4	4.9
Other	5.7	5.3	6.8	1.6

Note: * "Theme" refers to personal life themes as well as impersonal themes.

informational overlap between the information present at retrieval and the information stored in memory" (Tulving, 1979, p. 408). One way to address this question is to examine those parts of the remembered events that subsequently take the role as cues. To do so, I investigated whether the memory cues for involuntary memories recorded in a diary study were central or peripheral to the content of the remembered events (Berntsen, 1998). This categorization was based on the participants' descriptions of the cues and the content of the corresponding memories. In each case, we analyzed which role the feature that had been identified as a cue for the memory was playing in the overall event description. The role of the cue was analyzed independent of the fact that it had brought this particular memory to mind. That is, the raters simply conducted an analysis on the verbally described content of the event and assessed whether this

particular feature was central or peripheral to the description itself. A cue was scored as central to the event if it could not be replaced by a realistic alternative from the same category without changing the target of the subject's attention in the remembered event. Other cases were considered peripheral.

To illustrate this distinction, consider the following example of an involuntary memory (female, twenty-one years) that came to the participant's mind after she had stepped on a glass frame that broke under her feet. A similar incidence of breaking glass was part of the memory:

I had just got a new room and I was fixing it. I had got four new big mirrors for the wall and they were lying in the packing on the wooden floor. For some reason, I stepped on them. I did not expect this would do any damage, but the floor was not entirely level, so one of the mirrors broke. I was really sad about it because now I would only get three mirrors on the wall. I remember that I found it extremely unjust that the mirror broke when I stepped on it, since I could not know that the floor was not level.

As it appears, breaking the glass could not be replaced with an alternative (such as damaging the wallpaper) without changing the target of the subject's attention in the remembered episode. Consequently, the cue was scored as central to the memory.

The next example illustrates the case in which a cue plays a peripheral role in relation to the content of the remembered event. The memory comes to mind as the participant (male, twenty-five years) is considering whether he should put some homemade drinks into the refrigerator. The drinks are called "Black Swine" and his thoughts about them are followed by the memory:

We are in our room at the guest-house, packing. My girlfriend is folding up a table-cloth which we have washed because we happened to spill some "Black Swine" on it. My girlfriend suggests that we just place it folded on the table. Both of us find

it embarrassing that we have spilled something on the other table-cloth too.

As the example illustrates, the drink “Black Swine” is associated with the target of the remembered episode, namely, some embarrassing stains on the guest-house’s table-cloth. However, the fact that these stains came from spilling this particular drink appears quite irrelevant to this particular embarrassing experience. It would not change the target of the subject’s attention in the remembered event if the stains had come from, for example, red wine instead of “Black Swine.” Thus “Black Swine” could be replaced with an alternative, for which reason the cue was scored as peripheral to the memory content.

In short, central cues were distinctive for what the subject paid attention to in the specific, remembered situation (according to the person’s memory description). For this reason we should expect central cues to have higher discriminability and thus to be more common triggers of involuntary autobiographical memories than cues matching peripheral parts of the event, following the encoding specificity principle. This prediction agrees with the findings in that 74 percent of the cues were scored as central and 26 percent as peripheral in relation to the memory content (see Berntsen, 1998, for details). A similar dominance of central, content-related cues over peripherally associated cues was reported recently in a diary study by Schlagman *et al.* (2007).

To summarize, most involuntary autobiographical memories are activated by cues consisting of specific overlapping features between the current situation and the remembered event. These features are typically distinctive for what the person paid attention to in the remembered event. Typical cues are salient features of the everyday environment of the individual, such as other people, activities, objects, locations, and recurrent topics or themes. Such environmental features may elicit memories both when perceived in the physical environment and when represented in thoughts,

although the former is more common. Feeling states or pure sensory experiences are quite infrequent as cues for involuntary memories.

These findings can be seen to suggest that what triggers involuntary autobiographical memories reflect which types of information is recurrent in our lives, so that it can occur both as part of the past event and as a cue in the present situation. At the same time it should be salient enough to be noticed and remembered. Because involuntary autobiographical memories are triggered by such recurrent and salient features, they may help to create a sense of continuity across time, both regarding ourselves and our surroundings. For example, a memory activated by a specific object in our daily life would often hold a piece of history about our interactions with this object in the past – maybe it was given to us on a specific occasion, which springs to mind. The memory may also have directive functions (Pillemer, 2003) that speak directly to aspects of our daily life: Maybe we should not be drinking so much, after all. Maybe we should be more careful with breakable glass – to allude to the two examples given before.

Another implication is that what are common and less common cues for involuntary autobiographical memories will to a certain extent vary as a function of differences in the activities and environments of the study populations (e.g., farmers versus psychology students) and will vary across individuals to the extent that their personal environment, activities, and interests vary.

ATTENTIONAL AND MOTIVATIONAL BIASES

Finding that involuntary autobiographical memories generally have cues and that these cues typically are central, content-addressing features poses some limits on the number of stored events that may be accessible for involuntary remembering in a given situation. Furthermore, in Chapter 4, I reviewed evidence showing that the accessibility of involuntary autobiographical memories is enhanced by well-known encoding and maintenance factors, such as emotion, recency, and life impact. Thus, in a given situation, the range of past

events that are likely candidates for involuntary memories is limited by available cues as well as by factors affecting memory accessibility. However, it is still puzzling how, in a given situation, a person's attention is drawn towards a feature that is able to activate a memory. Given that people report that they have such memories only a few times a day (e.g., Berntsen 1996), this obviously happens in relation to only a small fraction of features present in any particular situation. To illustrate, in one of the examples quoted above, the diary participant suddenly remembered a situation in which some embarrassing stains from a particular drink were discovered on the table-cloth in a guest-house. This memory was elicited in the following situation, as described by the participant:

It is late in the afternoon. I am sitting by my desk, studying. My girlfriend is also in the room. She is reading too. Everything is quiet. Earlier this afternoon, we made "Black Swine" from some Russian Vodka. I am wondering whether we ought to put the drinks into the refrigerator.

Why did this person suddenly think of the drinks instead of concentrating on reading? Obviously, some motivational factors may be at work here, yielding some features of the ongoing situation subjectively more salient and interesting than others. In this regard, it is useful to remember a distinction between involuntary and voluntary attention described by Kahneman (1973). In his theory, voluntary attention is an engagement in activities selected by current plans and goals (such as studying, as in the example given before). Involuntary attention, on the other hand, is an engagement in activities selected by "enduring dispositions" (p. 11), such as our tendency to allocate attention to novel and surprising features or features of high personal relevance (e.g., our own name being mentioned in a neighboring conversation). Kahneman's (1973) distinction between voluntary and involuntary attention maps on to Berlyne's (1966) distinction between specific and diversive exploration. Specific exploration is directed towards a specific goal or problem

whereas diversive exploration takes place with no specific goal in mind. The animal simply seeks out some stimulation with no specific purpose, and features that are novel, surprising, complex, and offer a change or variety will impulsively be favored. Diversive exploration is often a response to a boring and/or non-demanding situation, such as reading a dreary textbook or attending an uninteresting lecture. Daydreaming may therefore be regarded as a form of diversive exploration (e.g., Singer, 1966; see Chapter 2).

Returning to the example of the student, another striking observation is the level of concentration characterizing the person when the memory comes to mind. The fact that he is thinking of the drinks while reading suggests that he is not fully concentrated. Rather, he seems to be diversively exploring his environment, looking for some more exciting stimulation, which puts him into a suitable mode for having an involuntary memory, according to the literature on daydreaming (Singer, 1966). In the following, we will take a closer look at such attentional and motivational biases and discuss how they may interact with cuing via associations.

A relaxed state of awareness

In studies of daydreaming it has consistently been found that the frequency of irrelevant, spontaneous thoughts decreases when the attentional demands of a parallel ongoing task increase (Singer, 1966). Similarly, involuntary autobiographical memories often arise when a person is in a non-focused state of awareness, such as attending an uninteresting lecture, relaxing on the sofa, or exercising. In a diary study (Berntsen, 1998), I categorized participants' descriptions of what they were doing when the memory came to mind according to whether their attention had been focused or diffuse. I found that two-thirds of the memories came to mind in situations characterized by activities that were not attention-demanding. This predominance of diffuse attention was consistent across subjects: only one of fourteen participants was most frequently concentrated on a task when having an involuntary memory. Schlagman *et al.* (2007) studied involuntary

autobiographical memories among younger and older participants. They classified their participants' descriptions of ongoing activities as automatic (such as walking, eating, and driving) or controlled (such as reading, writing, or attending a meeting). For both groups they found a greater frequency of involuntary autobiographical memories during automatic activities (61 percent) than during controlled activities (39 percent), although in the older sample this finding was not replicated in an analysis based on the participants' subjective ratings of level of concentration. In studies of involuntary semantic and involuntary autobiographical memories among undergraduates, Kvavilashvili and Mandler (2004) found a dominance of low levels of concentration relative to high levels for both types of involuntary recall.

Thus these studies consistently show that involuntary memories most frequently arise during activities that are not attention-demanding. Unfortunately, the diary studies suffer from the absence of a baseline measure as to how much of the time attention in general is non-focused. If attention is diffuse most of our waking time, we should of course expect involuntary memories to be more frequently associated with such states (assuming other things are equal). One way to clarify this issue is to measure frequency of involuntary memories under systematically varied levels of cognitive load. Such manipulations have been carried out in studies of daydreaming and task-unrelated thought (Singer, 1966, 1975, 1993) showing that frequency of task-unrelated thoughts decreases with increasing cognitive demands of the situation. Recently, Ball (2007) reported similar findings in a study involving laboratory-induced involuntary autobiographical memories. Thus attention-demanding activities appear to somehow hamper the activation of involuntary memories. This can be seen to suggest that involuntary memories are generated through the same mechanisms that monitor cognitive-demanding activities (Baddeley, 1993) or, alternatively, that attention-demanding activities inhibit the activation of task-irrelevant thoughts (Mandler, 1994) and/or reduce the likelihood of attending to them and recording them in a given study. It is also consistent with observations on a so-called

default brain network referring to particular areas in the brain that are more active during resting conditions than during cognitive tasks, for which reason it is assumed to be responsible for the production of spontaneous mental activity as observed in daydreaming (e.g., Mason *et al.*, 2007; see Chapter 1).

Motivational biases

As pointed out earlier, cues for involuntary memories are normally content-addressing parts of the remembered events. At the same time, the cues are usually background features for the situation in which the memory comes to mind. When the central versus peripheral classifications described earlier were applied to the retrieval situation (instead of the memory), the cue was found to be peripheral for the ongoing activity in two-thirds of the cases (Berntsen, 1998). This finding should be seen in relation to the fact that involuntary memories most frequently come to mind when the person's attention is diffuse. When attention is diffuse, nothing is clearly in focus and a feature in the background may suddenly get enough attention to form a sufficiently strong association for activating the memory. As argued by Kahneman (1973) and Berlyne (1966), such an involuntary allocation of attention is likely to favor features that are novel, surprising, or in other ways schema-deviant (for a more recent advocate of this view, see Litman, 2005).

To illustrate these points, consider the following example of an involuntary memory activated by the sound of thunder. The memory deals with a situation from a period when this participant worked as an au pair in the USA (female, twenty-one years).

The present situation: I am lying on my sofa, reading Gibson – psychology of perception. It is blowing heavily outside. It almost sounds like thunder.

The memory: I am in the US. I am together with the kids. It was in the beginning of my stay so everything was still quite unfamiliar. There is a thunderstorm outside, it sounds really bad.

The kids and I are sitting on the sofa, covered by a blanket. The younger one is quite relaxed whereas the older is afraid of the thunder. I am talking to her – trying to make her think of something else.

Why did the sound of thunder become a memory cue? Apparently, this was not due to any conscious and controlled mechanism. Attention was involuntarily allocated to the sound of thunder probably because this feature was novel and maybe surprising. In addition, factors related to personal significance are likely to have contributed as well. This is supported by the observation of some striking thematic overlaps between memories recorded by this participant. The memory of the thunderstorm quoted above was one of a total of twenty-one memories (42 percent of her fifty records) about her time as an au pair in the USA – a stay that had taken place roughly one year prior to her participation in the diary study. When interviewed subsequent to the diary period, she explained that during the time of the diary study she had tried to reach the host family, because she would like to go back and visit them the following summer. However, she had not been very successful at re-establishing contact during the time she took part in the study.

Similar observations were made for other participants in diary studies. For example, nine of the forty recorded memories (23 percent) of a twenty-four-year-old male participant concerned experiences with a girlfriend with whom he had broken up a few weeks prior to the diary study. In other cases, a striking deviation from the ordinary retention curve was observed. A young female recorded twelve memories (24 percent) about events that had taken place six years before the diary study, which was nearly as many as the fifteen memories (30 percent) she recorded about events from the most recent year. Six years back in time, thus at the time of the memory peak, she had experienced an unwanted pregnancy. Because of her young age and some other problematic circumstances surrounding the pregnancy, she had felt compelled to end it with an abortion, even

though she was against abortion. When interviewed subsequent to the diary study, she said that she was still struggling with coming to terms with this event.

In order to understand the interplay between factors referring to personal significance and cuing via association, I believe that three constructs are useful to consider. One is Klinger's (1978) notion of *current concerns* – that is “the state of an organism between the time it becomes committed to pursuing a goal and the time it either gains the goal or abandons the pursuit” (1978, p. 249). A current concern is an inner state of the organism that increases the sensitivity of the organism to concern-related cues. Klos and Singer (1981) describe a related notion of *unfinished personal business*, referring to long-standing personal issues or problems that are currently influencing the person's life. A third construct, which I will add here, is a phenomenon we may call *stirring events*. By this I mean recent personal events with a substantial impact on our emotional life (either positive or negative), such as the death of a close person or receiving a prestigious award. Obviously, these three notions may to some extent overlap. And, as I will argue, all three may be regarded as motivational factors that interact with associative mechanisms related to the activation of involuntary autobiographical memories.

All of these factors may increase the sensitivity of the individual to certain cues rather than others. Klinger (1978) had participants listen to tape-recorded readings of literary texts with some embedded passages that were modified to relate obliquely to a previously identified current concern of the participant. The experiment was designed so that concern-related and non-concern-related passages were played at the same time to different ears. Through the listening time the participant indicated with a switch to which channel he or she was attending. The listening was interrupted regularly by thought sampling tasks in which the participant reported his or her latest thoughts. The results showed that the participants attended more to the concern-related passages, had more thoughts related to them, and recalled them roughly twice as often as the non-concern-related parts

of the reading. Mace (2005) demonstrated priming effects in relation to involuntary autobiographical memories. In the middle of a recording-period for a diary study of involuntary autobiographical memories, the participants were asked to return to the laboratory and to voluntarily retrieve memories from a specific time period in their life (e.g., high school). After this intervening task, the participants reported more involuntary memories from this specific period in their lives than they had done before the laboratory task. Ehlers and Clark (2000) speculated that a traumatic event may cause strong perceptual priming for stimuli that were temporally associated with this event, so that such stimuli are more readily noticed afterwards and therefore more easily take the role of cues for intrusive trauma memories. For these reasons, the same traumatic memory parts will often be triggered repeatedly by the same cues. Pursuing this idea, Ehlers *et al.* (2006) had their participants watch a series of traumatic and neutral picture stories, followed by a priming task (an object identification task). They found that neutral stimuli preceding the traumatic material were more strongly primed than neutral stimuli preceding the neutral picture sequences.

These findings can be seen to suggest that attentive and/or preattentive processes will often be biased towards stimuli that are associated with current concerns or recent stirring events, so that such stimuli will have greater chances of being noticed and, thus, greater chances of forming cues for involuntary autobiographical memories. In addition to increasing the salience of certain memory cues, motivational factors may prime certain subclasses of autobiographical memories – such as memories related to a specific period of life or a particular person – so that these memories become more accessible and thus easier to activate than other memories.

*The interplay between cuing via association
and motivational factors*

In order to delineate in more detail how motivational and associative factors may work together, I have previously distinguished what can

be described as two different psychological levels of any given situation: (1) The *immediate situation*, and (2) the current *life situation* of the person (see Berntsen, 2007). The most important difference between the two levels is that they have different extensions in time. The *immediate situation* is that specific moment in which an involuntary memory comes to mind. As we have seen in this chapter, the immediate situation usually provides cues for the memory. The *life situation* is a personal construct that refers to the individual's current appraisal of his or her recent past and close future. It includes the three motivational constructs mentioned in the previous section – i.e., current concerns, unfinished personal business, and the impact of stirring events. The life situation will thus have different emotional coloring at different times in our lives. There may be periods generally characterized by happiness, where the pursuit of personal goals goes well, and where no stirring event with a negative content has recently left an impact. There will also be periods characterized by frustration in relation to attaining some desired goals with the possible consequence of disengagement and maybe depression (Klinger, 1975). In both cases, the life situation will influence the activation of involuntary memories.

My suggestion is that the life situation primes clusters of thematically related autobiographical memories and increases the individual's sensitivity to cues with relevance to the life situation. The immediate situation triggers a particular memory from the preactivated set if one or more features attended to in the immediate situation overlap critically with the content of one of the preactivated memories. Memories that are primed by the life situation but do not possess concrete resemblance to features in the immediate situation are in most cases unlikely to be brought to mind. The degree of overlap is important – consistent with the finding that the majority of the cues for involuntary memories corresponded to a central feature of the remembered event.

The relevance of this framework is not limited to the activation of involuntary autobiographical memories. In principle, it may also

be used to describe voluntary recall of personal memories, for example in response to cue words. It can therefore be related to other models of autobiographical memory retrieval that emphasize motivational factors in addition to associative mechanisms (Conway and Pleydell-Pearce, 2000). However, here I focus on the implications for involuntary memories.

The fact that recent events dominate among involuntary autobiographical memories (as they also do for voluntary autobiographical memories) may be partly explained in terms of the joint influence of the life situation and cues in the immediate situation. As has been pointed out (Anderson and Schooler, 1991) the presence of certain cues in our environment (e.g., newspaper headlines) shows the same drop over time as the forgetting curve. In other words, our present surroundings contain more cues capable of activating memories from yesterday than memories from our childhood. Likewise, our life situation (as defined here) is probably more often influenced by recent experiences than experiences dating back several years. Thus both factors would favor recent over remote events.

As we have seen, several studies suggest that involuntary memories are more likely to occur when the person is in a relaxed and non-focused state of awareness. Presumably, when the immediate situation is not attention demanding, the allocation of attention becomes involuntary and thus controlled by enduring dispositions, following Kahneman (1973), as well as by themes of particular personal significance (e.g., Klinger, 1975). Obviously, this will increase the likelihood that the person stumbles upon a feature that is able to activate a memory somewhat associated with the person's present concerns. Such drifting is more likely to take place when the person is involved with activities that take little cognitive effort, such as peeling potatoes, washing dishes, or lying on the sofa listening to music, as compared to when he or she is concentrating on an engaging task. Of course, there may be other explanations of the apparent dominance of diffuse attention when involuntary memories come to mind. For example, as mentioned by Mandler

(1994), concentrating on a certain task is likely to constrain associative activation by causing an inhibition of knowledge units that are inconsistent with the task at hand.

The relative importance of the constraints posed by the life situation and the immediate situation, respectively, on the selective activation of involuntary autobiographical memories is likely to vary from time to time in a person's life. During periods with highly pressing personal concerns, the memories are primarily specified by the constraints posed by the life situation and only secondarily by cues in the immediate situation. During such periods, there will typically be an increase in involuntary memories that are thematically related to one another and come to mind in response to rather vague cues or even with no identifiable cues. For example, after the death of a significant other, even very vague cues may be able to activate memories related to this particular person. The turmoil following a stirring event, such as a traumatic or extremely happy event, is also likely to influence the life situation profoundly, and may lead to repeated activations of memories referring to this and associated events, as observed in PTSD (American Psychiatric Association, 2000). In contrast, during a period characterized by a more stable and calm life situation, a higher cue-dependency and greater thematic diversity would be observed in a person's sample of involuntary autobiographical memories. Obviously, individual differences related to this issue may be found as well in that some (presumably more introverted) individuals may be more likely to dwell upon their life situation, whereas others may be more responsive to stimuli of the immediate situation (Berntsen, 2007).

The interaction between the immediate situation and constraints imposed by the life situation may be viewed as an interaction between mechanical association and motivational factors. Other theories have attempted to integrate motivational and associative factors to account for the flow of thought. For example, Klinger (1978) argued that "moment-to-moment thoughts are determined jointly by motivational factors and by ambient or internal cues" (p. 248). And

there is a long history in psychology of systematic attempts to explain effects of motivational constraints on real-life cognition and behavior (e.g., Lewin, 1951). As Bartlett (1932) observed:

If we are to treat the problems of associations as functional, we have to use attitudes, orientation, appetitive and instinctive tendencies and interests as our active, organising factors. Whatever material is dealt with by persistent reaction tendencies of these types will tend to be associated (p. 307).

More recently, Conway and Pleydell-Pearce (2000) argued that involuntary autobiographical memories construed spontaneously in response to specific cues need to be consistent with the goals of the working self in order to be activated. In the present framework, the content of involuntary autobiographical memories is not necessarily consistent with the individual's goals. Because involuntary autobiographical memories are mostly triggered by external cues whose presence we often do not control or foresee, the activation of a particular involuntary memory at a certain time is bound to be at least partly accidental and partly independent of accessibility constraints that the individual unconsciously imposes. The content of involuntary memories is thus shaped by the combined influence of motivational factors and the accidental presence of certain cues, together with factors that influence the encoding and maintenance of events and thus their overall availability (Tversky and Kahneman, 1973; see also Chapter 4).

WHY AREN'T WE FLOODED BY INVOLUNTARY MEMORIES?

Maybe the most pressing question in relation to involuntary autobiographical memories is not so much how they come to mind as why they do not come to mind all the time? A glance around in your current surroundings is likely to reveal a multitude of potential memory cues. If you dwell upon each of such features, you are likely to be able to voluntarily generate a memory in response to it after

some time, as demonstrated in experiments conducted by Galton (1907) and replicated and extended by Berntsen and Hall (2004). If having involuntary autobiographical memories were just a matter of available memory cues, we should thus be flooded by such memories throughout our waking life. However, most of the time we are not.

One thing that we know works against having involuntary memories is being concentrated on a task that requires cognitive effort, as mentioned earlier. It seems that during the times we are concentrated and engaged in such tasks, we are likely to hold back the associative processes that might otherwise lead to the activation of involuntary memories (Mandler, 1994). In addition, our working memory may be too occupied by the ongoing task to allow the spontaneous formation of involuntary memories (Baddeley, 1993). Although theoretically complicated, the impeding effect of an ongoing demanding task seems to make intuitive sense. In addition, there are a number of other possible reasons why we are normally not flooded by involuntary memories, which I describe in what follows.

Even though having an involuntary autobiographical memory seems to be one of the easiest things in the world, I shall argue that it is an occurrence that takes place only if a number of preconditions are satisfied. If we think of autobiographical memory as a complex associative network, consistent with prevalent theories (Conway and Pleydell-Pearce, 2000; Rubin, 2006), a concrete autobiographical memory can be generated spontaneously if the cue (or cues) that starts the process is able to activate event-relevant units, or nodes, in the network and deactivate irrelevant units that would otherwise interfere with the construction of the memory. If the latter does not take place, the activation will be too indistinct to form a memory. In such a situation we will happily walk around in our everyday environment surrounded by familiar tea mugs, shoes, piles of papers, sounds of lawn mowers, birds, and barking dogs without any of this triggering a clear memory, although all of these features may have been parts of past events. In other words, in order to spontaneously activate an autobiographical memory, the cue has to be sufficiently

distinct to discriminate a past event from alternatives. Rubin (1995) calls this phenomenon cue-item discriminability, which he defines as "how easily a given cue isolates an item" (p. 151).

Rubin (1995) shows the usefulness of cue-item discriminability for explaining memory in oral traditions. I will here accommodate the notion to the activation of involuntary autobiographical memories. In this particular context, I will argue that several factors are likely to contribute to cue-item discriminability and thus to the sudden activation of an involuntary memory. The following categories are hypothetical. I believe that they are useful theoretical distinctions, although actual involuntary memories are likely to operate through combinations of some of these constraints.

Cue underload

Cue underload is a term borrowed from Rubin (1995). I use it here to refer to the hypothetical situation in which a memory cue matches only one past event in autobiographical memory. In this case, the cue is a feature of the current situation that has been encountered only once before, namely in that particular past event that comes to mind in response to this cue. If you had blueberry wine only once in your entire life, this occasion is likely to spontaneously come to mind if you ever have this drink again. Cue underload is probably the simplest case of high levels of cue-item discriminability. To illustrate the phenomenon with an example from a diary study: a participant recorded an involuntary memory of an episode in which a low-flying bird almost bumped into her, while she was walking down a street. This memory was triggered while she was walking down a street and (another) low-flying bird almost bumped into her. Because of the high similarity between the remembered event and the cue, as well as the infrequency of this peculiar situation, the likelihood that the bird-collision cue could have matched another autobiographical memory equally well is very low. Thus, cue-item discriminability was high, for which reason the memory of the first near-accident spontaneously popped up.

Multiple cues

If several features of the current situation match a past event, the likelihood that this combination of cues will fit another memory equally well is low. Thus multiple cues working together increase cue-item discriminability and thereby the likelihood of spontaneously arising memories. For example, a participant in a diary study reported an involuntary memory of being assaulted while she was jogging alone on an isolated nature trail and suddenly heard sounds behind her. This memory was triggered by a combination of features highly similar to the content of the memory: The memory came while she was (1) jogging by herself on (2) an isolated nature trail and (3) suddenly noticed a male person on the trail. Multiple cues may help to explain recurrent involuntary trauma memories, as I will discuss in Chapter 7.

Distinctiveness

Cue-item discriminability depends on the memory as much as on the cue. If a cue matches a number of past events equally well, the ability of this redundant cue to isolate one of them is obviously low. However, the redundant cue will get a lot of help if one of the past events in the cue-related sample is considerably more distinctive than the rest. Distinctiveness is defined by Hunt (2006) as the processing of difference within the context of similarity (p. 12), and it is known to increase the ease with which memories can be accessed. Its relevance in relation to the activation of involuntary memories can be illustrated by the following example: a participant in a diary study recorded a memory triggered by the sound of a soda bottle being opened. This cue in itself would be pretty redundant since a lot of past events would be very likely to have involved soda bottles being opened with a “pop.” However, the recorded memory was about an episode in which this particular sound played a distinctive role: In the remembered event, the participant was taking a written exam together with a lot of other students. The exam questions had just been passed around and everyone was tense when suddenly the

sound of a soda bottle being opened with an unusually loud “pop” interrupted the silence and made people laugh.

Rehearsal, emotion, and recency

Frequent rehearsal of a past event in thoughts and conversations is likely to have similar effects as distinctiveness. Thus if a cue matches a number of past events, but one of them is more frequently rehearsed, the memory of this event may be brought to mind. Rehearsal can have this effect because it increases the strengths of the network connections that need to be activated for the memory to be formed. Frequent rehearsal forms memories that are “ready to go,” as it were. If a cue matches a number of past events of which one is highly rehearsed and thus “ready to go” the cue may be able to isolate this event and thus generate an involuntary memory, in spite of its redundancy. Similar claims can be made for memories of recent and/or highly emotional events.

Motivational biases

As discussed in the previous section on the interplay between motivation and cuing, the life situation of the person may cause a pre-selection of a certain (current-concerns-related) sample of memories. Assuming that a cue matches a number of past events, its ability to isolate one of them will be increased if one of them is favored by such motivational factors. In addition, as pointed out earlier, current concerns may bias attention in favor of potential cues that match particular concern-related memories and also thereby enhance cue-item discriminability.

The five categories delineated here differ in how they relate to the distinction between the immediate situation and the life situation described earlier in this chapter. The first three categories (*cue underload*, *multiple cues*, and *distinctiveness*) are primarily concerned with characteristics of the cue and how well it matches and discriminates the content of a particular memory. These three categories are therefore mostly concerned with the influence of the

immediate situation on the activation of the memories. The last two categories (*rehearsal, emotion, and recency* and *motivational biases*), on the other hand, are concerned with the overall availability of the memories independent of the presence of concrete cues. Because this overall availability is partly formed by motivational and emotional factors, the last two categories are more directly related to the life situation construct described earlier. In the [next chapter](#) I will argue that the retrieval processes subsumed under the first three categories are the main source of content differences between involuntary and voluntary memories, whereas the two classes of autobiographical memories are unlikely to differ with regard to the availability constraints characterizing the last two categories (see [Chapter 4](#) for some evidence for this claim).

In sum, even though there are many ways of having involuntary autobiographical memories, not all situations will allow their occurrence. As noted by Conway and Pleydell-Pearce (2000): “In terms of the moment-by-moment activation of the knowledge base, such occurrences are rare, but as an everyday experience spontaneous recall occurs fairly frequently” (p. 275). In this chapter, I have argued that naturally occurring variations in cue-item discriminability and level of concentration seem to be major predictors for their occurrence. As I will argue in the [next chapter](#), some of this has consequences for the content of involuntary memories and how they differ from memories recalled in a goal-directed way.

6 Differences between involuntary and voluntary autobiographical memories

And so it is with our past. It is a labour in vain to attempt to recapture it: all the efforts of our intellect must prove futile. The past is hidden somewhere outside the realm, beyond the reach of the intellect, in some material object (in the sensation that material object will give us) which we do not expect.

(Proust, 1928, p. 61)

Despite many similarities (see Chapter 4), some important differences can be found between involuntary and voluntary autobiographical memories. These differences are best explained as consequences of the different ways in which the two kinds of memories are retrieved. As pointed out by Tulving more than thirty years ago: “the interaction between trace information and retrieval information [is the] *sine qua non* of all memory phenomena” (Tulving, 1974, p. 75). In other words, the content of both involuntary and voluntary autobiographical memories is formed by an interaction between the retrieval process and stored autobiographical information. Because of the dissimilar retrieval mechanisms characterizing the two kinds of memories, the content of involuntary and voluntary recollections tends to differ on some dimensions.

The most direct evidence for this claim comes from a recent diary study examining representations of possible personal events in the future that come to mind involuntarily – that is, with no preceding retrieval attempt (Berntsen and Jacobsen, in press). Such involuntary future representations (or flash forwards) were compared to representations of future events recalled voluntarily in response to cue words. The same participants also recorded involuntary autobiographical memories and voluntary (word-cued) memories as part

of the same study. The involuntary future event representations followed almost exactly the same pattern as the involuntary autobiographical memories. They came to mind in response to the same types of cues and most frequently when attention was diffuse. They showed similar differences to the voluntary representations of future and past events with regard to level of specificity and phenomenological qualities, largely replicating previous findings on differences between involuntary and voluntary autobiographical memories (to be reviewed later in this chapter). Because no encoding is involved for the future event representations (indeed, it is a defining criterion that the events have not yet been experienced by the subjects), and because the differences between them matched the differences between involuntary and voluntary autobiographical memories, these differences are most likely due to factors operating at the time of retrieval, not at encoding. In Chapter 8, I will go into more detail concerning the characteristics of involuntary future event representations as compared to involuntary autobiographical memories.

These recent findings agree with my main point in Chapter 4, namely that involuntary and voluntary autobiographical memories are similar with regard to factors that are generally assumed to influence encoding and maintenance of autobiographical memories. I reviewed evidence that involuntary and voluntary autobiographical memories do not differ with regard to emotional content and distribution across the life span. On this basis, I argued that involuntary autobiographical memories differ from their voluntary counterpart only with respect to the way they come to mind. However, the differences in relation to retrieval mechanisms entail differences related to the content and qualities of the two kinds of memories. As I will argue in the present chapter, these differences have to do with the specificity of the memories, their distinctiveness, and life-story relevance, as well as their ability to affect us emotionally. I will review evidence for these differences and discuss how they can be seen as a byproduct of different ways of retrieving involuntary versus voluntary

autobiographical memories. I will also discuss how these differences relate to observations on involuntary autobiographical memories made by artists (Proust, 1932–8; Salaman, 1982) and, in Chapter 7, how they relate to clinical observations on traumatic flashback.

RETRIEVAL-RELATED DIFFERENCES

Theories of voluntary autobiographical recall are generally based on a retrieval model introduced by Norman and Bobrow (1979) in which strategic retrieval is viewed as a cyclic process (see also my description of feedback models in Chapter 1). The process begins with a search description, made in response to a memory request. The search description directs the search and specifies criteria for its completion. A successful retrieval process ends with the activation of a memory that satisfies the criteria of the search description. Attempts that fail to activate a satisfactory memory help to modify the search description. Conway and Pleydell-Pearce (2000) accommodated this retrieval model to autobiographical memory. In their account, retrieval from autobiographical memory starts with a search description that is based on generic autobiographical knowledge and constrained by current goals of the self.

Autobiographical memories are assumed to involve different levels of abstraction that, viewed as a total, form a hierarchy of autobiographical knowledge (Bluck and Habermas, 2001; Conway 2005; Conway and Pleydell-Pearce, 2000; Levine *et al.*, 2002). Although the exact description of these levels differs among theories, they all seem to share the idea that autobiographical memories vary along a dimension of specificity. Some memories are assumed to include mostly “conceptual” or “semantic” information. This is information that is not specific to a particular autobiographical event but applies to a variety of past experiences and is thus able to summarize characteristics that are shared by several events, such as thematic and temporal similarities. A relevant example is general event representations, summarizing shared characteristics of recurrent episodes (i.e., driving to work in x-town) and thus abstracting

from specific incidences of this category of events (i.e., the day the motorway exit was closed because of an accident). Constructing a life story involves an ability to perceive such higher-order conceptual regularities among classes of events (Bluck and Habermas, 2001; Habermas and Bluck, 2000) for which reason the life story is sometimes viewed as the highest level of autobiographical abstraction (e.g., Conway, 2005). The opposite end of the specificity continuum is information that pertains to particular episodes and helps to discriminate each unique episode from similar occurrences.

Because the search description in voluntary recall is generated from our generic autobiographical knowledge, we should expect voluntary retrieval to be especially efficient at accessing memories of events that are consistent with our schematic autobiographical knowledge and are seen as relevant to our life story. Indeed, Conway and colleagues have presented evidence that early phases of retrieval from autobiographical memory typically access schematic autobiographical knowledge, such as knowledge of general events (e.g., summarized representations of similar episodes) or knowledge of specific periods in life (e.g., Haque and Conway, 2001).

Involuntary retrieval from autobiographical memory differs from voluntary retrieval in a number of ways (see Table 6.1). Cues for involuntary memories are unselected situational features that are present either in the environment or in thoughts. The cues are not elaborated into a search description that directs retrieval. The ability of the cue to discriminate a past event from alternatives through spreading activation determines whether or not an involuntary memory will arise (see also Chapter 5).

Because the search description stage is bypassed in the case of involuntary memories, we should expect shorter latency between presentation of the cue and completion of retrieval than is found for voluntary memories. This is consistent with recent evidence (Haque and Conway, 2001; Schlagman and Kvavilashvili, 2008). Importantly, involuntary recall is likely to access events that a situational cue can discriminate from alternatives. This results in certain differences in

Table 6.1. *Differences between involuntary and voluntary retrieval*

Retrieval phase	Involuntary	Voluntary
Initiation “cue”	Situational feature	Verbal request or thought
Elaboration of cue	None	Search description based on generic knowledge
Search and completion	Memory discriminated by situational cue	Memory discriminated by search description

the content of involuntary versus voluntary autobiographical memories, which I will describe in the following.

Events favored by involuntary relative to voluntary retrieval

According to the view proposed in Chapter 5, a high level of cue-item discriminability is a precondition for the activation of an involuntary autobiographical memory. This condition can be met in a number of different ways, described in Chapter 5 and summarized in Table 6.2.

The categories in Table 6.2 are useful theoretical distinctions for our present purpose, although in real life involuntary memories may often operate through combinations of some of these constraints, rather than being instantiations of only one of them (for example, a non-redundant cue may activate a frequently rehearsed memory, thus combining categories 1 and 5 in Table 6.2). Especially important for our present purpose is the observation that each of the different types of cue-item discriminability in Table 6.2 favors certain autobiographical events over others. In some cases, the events being favored are identical to the kind of events that we should expect voluntary recall to access. Thus both kinds of memory would favor emotional, recent, and rehearsed memories over neutral, remote, and less rehearsed memories. Evidence reviewed in Chapter 4 supported the view that the content of voluntary and involuntary memories

Table 6.2. *Ways of cuing involuntary autobiographical memories and the information they favor*

Category	Description	Events favored
1. Cue underload	Infrequent feature triggers memory of event that also involved an encounter with this infrequent feature	Events involving infrequent features
2. Multiple cues	Infrequent combination of features triggers memory of event involving an identical infrequent feature combination	Event involving infrequent combinations of features
3. Distinctiveness	Common feature (i.e., redundant cue) activates memory in which the same feature is placed in a novel/distinctive context	Distinctive/novel events
4. Motivational biases	Common feature (i.e., redundant cue) activates memory that is more accessible than other cue-related memories because of motivational biases	Events relevant to current concerns, etc.
5. Rehearsal, emotion, recency	Common feature (i.e., redundant cue) activates memory that is more accessible than other cue-related memories as a result of rehearsal, emotion, recency, or combinations of these	Events that are frequently rehearsed, emotional, and/or recent

generally does not differ along these well-known encoding and maintenance factors. Although some studies suggest that, on average, involuntary autobiographical memories are less rehearsed than voluntary memories (Berntsen, 1998; Rubin *et al.*, 2008b; but see Berntsen and Hall, 2004), rehearsing an event (in conversations and thought) increases the accessibility of an event for involuntary recall in the same way as it does for voluntary recall (see Chapter 4). We would also expect the content of both kinds of memories to show motivational biases (see Chapter 5). At the present, we have no evidence suggesting that such motivational biases would differ for involuntary and voluntary recall.

However, the first three categories of Table 6.2 are likely to be underrepresented in voluntary recall relative to their frequency in involuntary recall, because they all involve the activation of an event that contains unusual or novel elements. Cues for such unusual, non-schematic elements are hard to generate through a top-down process, because they are often not very relevant to higher-order autobiographical knowledge, such as our life story or self-schema. It is sometimes argued that only experiences that are central to our self and identity are stored on a long-term basis in autobiographical memory (e.g., Conway, 2005; Nelson, 1993). This is likely to be an exaggeration, overlooking the fact that other factors than self-relevance motivate what we pay attention to in our daily lives. Humans as well as other animals spend a lot of time engaging in explorative activities that are not directed toward specific self-relevant goals (e.g., Berlyne, 1966). During such diversive exploration, attention is involuntarily directed towards features that are novel, surprising, complex, and/or offer a change in the environment. Experiences involving such features are likely to be stored in memory because they are arousing and attention-grIPPING and not because they are central to our life story and identity, which they often may not be. For example, while jogging I notice with curiosity a big hawk waddling around on the top of a hedge, as if it is too heavy to take off. I am wondering whether I should call the animal rescue, but when I come back, it has left. On a different day, I meet one

of my Aarhus colleagues on a flight from Washington to Copenhagen. By chance, she has a seat right next to mine. On another trip I meet a distinguished Canadian colleague in Copenhagen airport. He remarks: "This is one of the spooky coincidences of life." On yet another occasion, a waiter from a lunch restaurant is running after me in a parking place. I am first quite surprised. I then realize that I have left my sunglasses in the restaurant and he is kindly bringing them to me. During a stay in the USA, to my surprise I win a gazebo in the local supermarket. Since I am not a native English speaker, I don't even know what a gazebo is. It sounds like the name of an endangered species to me. However, it turns out to be a tent of a certain kind. It is now sitting in my friend's garage, being almost as useless as my memory of the event is to my self-understanding. I will not bore you with more examples of such trivial but also somewhat peculiar experiences that daily life is filled with. We all have them. We may not remember them voluntarily. But if we come across something that reminds us of them, they may pop up in our minds. Indeed, such experiences are unusual, distinctive, and can be quite emotional for a short period of time, but they would typically not be considered part of our life story or personal identity. This does not mean that they are of no use; only that they are likely to serve different functions (Bluck *et al.*, 2005; see also Chapter 8). If they come to mind at a relevant time, they may have directive functions – for example help us understand a novel situation or suggest a solution to a certain problem (Pillemer, 2003; Schank, 1982). In short, the inclusion criteria for the first three categories in Table 6.2 are not life-story relevance, personal importance, and the like, but whether the past event involved infrequent features or infrequent combinations of features. Because the latter are harder to access through a voluntary retrieval strategy, categories 1–3 in Table 6.2 will be underrepresented in voluntary recall relative to involuntary recall.

Laboratory research on memory for distinctive material often invokes a distinction between item-specific and relational processing (Hunt, 2006). The same distinction seems useful in the present context. In an application of these terms to autobiographical

memory, relational processing has been operationalized as the process of identifying similarities among events, whereas item-specific processing is the process of detecting features that render a specific event different from other events in the sample (Smith and Hunt, 2005). Applying these notions to the categories of Table 6.2 suggests that the events favored in the first three categories involve more item-specific than relational processing. In the present usage of these terms, item-specific processing renders autobiographical events memorable through their perceived uniqueness, whereas relational processing renders autobiographical events memorable through their perceived connections and similarities with other events. Thus, following this line of reasoning, memorability through uniqueness will be more common for involuntary than voluntary memories, whereas memorability through schemata and life-story relevance will be relatively more common for voluntary than involuntary memories.

Illustrations of involuntary memories with distinctive features

To illustrate the importance of the first three cue categories in Table 6.2 in relation to the activation of involuntary autobiographical memories, consider some examples derived from a participant in a diary study (female, twenty-three years old).¹ This participant did not differ from other participants who took part in the study (Berntsen, 1996), in that her ratings of memory characteristics were well within the range of those of the other participants. To provide the examples, I simply analyzed the first twenty involuntary memories that this participant had recorded during the diary study, and examined whether they could be classified according to the first three categories provided in Table 6.2. Not all of the twenty memory records allowed such classification, but, as will appear, twelve out of the twenty did. When evaluating these examples, the reader may keep in mind that the distinction between these three categories may be

¹ All personal information is veiled to ensure anonymity. All names are made up.

debatable in some cases. However, this should not upset us too much, because all three categories illustrate the importance of distinctive memory features, which is the point I want to make. The reader should also keep in mind that the purpose of this exercise is not to formally test a theory but to illustrate its rationale.

Category 1: cue underload This term refers to cases in which the participant comes across an infrequent, unique feature (present either in the environment or in thought) which is followed by the activation of a memory in which this distinctive feature is present (see Table 6.2).

Example 1:

The participant is sitting in the library's reading room, studying. All of a sudden, very hard rain starts drumming on the flat roof above her. This is followed by the memory: "I was on a vacation with my boyfriend. We were very much in love and had a wonderful time in our tent in the most beautiful wood in Sweden. Once we were inside the tent, it started to rain extremely hard, so hard that we thought we would get wet – that the rain would go through the tent."

Example 2:

The participant is studying industrial psychology. She is relating what she reads to the work conditions at a specific factory in her hometown, which upsets her. In the cafeteria of that factory hangs a big painting, which she used to like. Her thoughts about the factory and the painting are followed by a memory in which she sees this particular painting as a child (according to her explanation, it was exactly the same painting): "I was at an art exhibition together with my parents. Among other things, there was a big painting of a man sitting on a bench reading a newspaper. I really liked this painting and I wanted my parents to buy it. They did not want to buy it, because they did not think it was nice, and I was mad at them for it. There were a lot of people and a lot of paintings."

Example 3:

The participant is sitting in a crowded auditorium, attending a lecture. The packed auditorium is hot and the air is bad. She is sitting next to her girlfriend and she notices a particular smell of perfume, which seems familiar. According to her explanation, the same smell of inexpensive perfume is present in the memory: "It was one of the last days of a vacation in Spain. The weather had been quite bad, but on this last day the sun was shining and it was really hot. All my friends and I were lying together at the pool, trying to get a tan, before we had to fly home – it was our last chance. There was a heavy smell of a particular sun lotion, which everyone used. I did not like the smell."

Example 4:

The participant is sitting in the library's reading room. From a neighboring room with Xerox machines, she notices the voices of two women talking together. One of them has a very special voice. According to her explanation, a similar special voice is present in the memory: "I lived at a dormitory with a lot of nice people. One evening two of my girlfriends came running down to my room. I could hear them laugh and talk on their way – one of them has a very special voice. It was dark outside and only little light in the corridor, but this did not matter, because they brought a candle which they lit right before they came into my room."

Category 2: multiple cues This term refers to the cases in which the participant comes across an infrequent, unique combination of features (present either in the environment or in thought) which is followed by the activation of a memory in which this distinctive combination of features is also present (see Table 6.2).

Example 5:

The participant is resting in bed with a sore throat, drinking tea. A similar combination of features is present in the memory (from her childhood): "I woke up one morning, feeling very sick. The

doctor came and examined me and said that it was just a sore throat. He told my grandmother that I should drink tea. I tried, but it was simply the worst thing that I had ever tasted and smelled."

Example 6:

The participant is sitting in the library's reading room. She notices a piece of paper that has slid under a screen separating her table from the neighboring table. A similar combination of features is present in the memory: "I am at a language exam together with the rest of my school class. I am sitting next to my girlfriend. There was screen a between us, preventing us from seeing what the other person wrote. My girlfriend passed a piece of paper under the screen to me, asking me how a certain word should be spelled. I wrote it on the paper and sent it back under the screen to her."

Category 3: distinctiveness This term refers to the cases in which the participant comes across a common feature, which forms a redundant cue in the sense that it is likely to match a range of past events. The redundant cue is followed by the activation of a memory in which this common feature is placed in an unusual, novel, or otherwise distinctive context. For example, the redundant cue may be followed by a memory of the person's first experience of this (now well-known) feature (see Table 6.2).

Example 7:

The participant is reading a chapter in her psychology textbook in which she comes across the name Cherry. According to her explanation, the same name was printed on the lip balm that figures in the (childhood) memory: "I was at my girlfriend's place, sitting next to her on her bed. She has just given me permission to try her new lip balm with cherry taste. I think it tastes extremely nice. Her mother enters the room and talks to us. She notices the lip balm and asks some questions about it. I say that it has a really great taste, like a taste of whisky. My girlfriend and her mother start to laugh and they are laughing for a very long time."

Example 8:

The participant is in her room sorting her lecture notes while watching television. A specific program begins, and the melody that leads into the program is followed by a memory of the first time she watched this particular program on TV: "I was at home with my parents, sitting on the sofa tired after sports training. I knew from someplace that tonight this particular program *The Crusaders* would be shown for the first time. Even though I knew nothing about it, I had decided to watch it. So I did. My parents were outside in the yard, because the weather was nice. They wanted me to come out, but I stayed inside and did not move at all."

Example 9:

The participant is sorting clothes and notices some old articles of underwear. This observation is followed by a memory of the day when this underwear was bought (namely on a trip abroad some years earlier with her school class): "We were three girlfriends who shared a hotel room. We had all been downtown to go shopping, and among other things, we had bought a lot of underwear. It was just ordinary underwear, but much less expensive here than at home, so we had bought a lot. When we came back to the hotel, one of our male friends came into our room. He asked if we had bought anything, and we showed him all the underwear. He looked very uneasy and shy."

Example 10:

The participant is studying. Her boyfriend is also in the room listening to music, using headphones in order not to disturb her. She hears a little anyway and recognizes the music. The same piece of music is part of the memory: "I was in the basement at my parents' house, ironing my clothes. I had a Walkman and I was listening to Bryan Adams from a cassette my boyfriend had given to me to listen to while he was on a trip. He had told me that I should think about him when I listened to the music. My mother

called from upstairs, but I pretended not to hear her. I was so happy in the basement with the music.”

Example 11:

The participant is in the library’s reading room. She is about to finish reading and is getting ready to meet with a couple of friends in the cafeteria. She is debating with herself whether she should make a mark in the book to indicate where she stopped reading. This is followed by a childhood memory about making marks in a book: “I had written or drawn something in a book I had borrowed at the library. It was done with ink, so it was impossible to remove. I had done it on purpose. However, afterwards I got really unhappy about it and I was too afraid to tell anyone. I was sitting all by myself in my little room, surrounded by all kinds of stuff, thinking about what I should do.”

Example 12:

The participant is at home, reading a complicated text for the lecture the next day. She is annoyed with the text, which she has a hard time understanding. She is wondering whether one of the other students in her class, Jacob, will ask the lecturer to explain it to them. The memory is also about Jacob – in a distinctive context: “We were sitting in the cafeteria. One of the students from my class was wearing a red suit that day – for some unknown reason. And Jacob was wearing a coat. It was in a pause between two lectures, and we were just sitting there telling jokes and making fun. The guy in the suit asked Jacob if they should trade clothes, since their clothes went so well together. Jacob agreed and asked the rest of us to witness the agreement.”

Thus most of the twenty memories could be classified as an instance of one of the first three categories in Table 6.2. The remaining eight memories dealt either with highly recent or emotional events (category 5 in Table 6.2), or appeared to be motivated by current concerns related to an impending trip back to her home town (category 4 in Table 6.2).

To summarize, we encode and maintain many unique experiences that may be fairly unimportant from a life-story point of view, but which are nonetheless preserved because of some distinctive elements. Memories of such experiences will be more easily accessed through involuntary than voluntary recall, because involuntary recall is not constrained by schema-driven search descriptions and because distinctive event-elements enhance cue-item specificity. This does not imply that these memories are inaccessible for voluntary recall. If the relevant cues were provided they might indeed be retrieved in response to a direct request. The point is that often such relevant cues will not be generated as part of a voluntary (schema-based) search.

Nor should the examples be taken to mean that involuntary autobiographical memories deal with strange experiences, while the content of voluntary autobiographical memories plays a central role in our life story. Because involuntary memories also favor emotional and frequently rehearsed memories (cf., category 5 in Table 6.2), a lot of involuntary memories will be deemed relevant for our life story. In a similar fashion, voluntary recall will sometimes access events with infrequent and bizarre or novel elements. However, my point is that the likelihood of the former is greater for voluntary memories and the likelihood of the latter is greater for involuntary memories. Thus on average we should see differences along these dimensions. Some evidence for this claim will be reviewed next.

Specificity, distinctiveness, and life-story relevance

According to the present view, memories of events with distinctive features that have been subject to item-specific processing are underrepresented in voluntary recall relative to involuntary recall, because they are harder to access through search descriptions generated from generic autobiographical knowledge than through situational cues (cf., Tables 6.1 and 6.2). On the other hand, events whose distinctive features are preserved in memory are unlikely to form generic event representations because this would require an abstraction from their unique characteristics. Accordingly, we should expect

memories of specific episodes to be more frequent among involuntary than voluntary memories. We should also expect involuntary autobiographical memories to refer to events that are appreciated as more unusual (unique and distinctive) than the content of voluntary memories. In addition, involuntary memories should be seen as less central to the person's life story and identity as compared to voluntary autobiographical memories. In the following, I will review some evidence in support of these claims.

A number of studies have documented that involuntary memories more frequently than voluntary memories deal with specific episodes. In relation to one of my first diary studies, I compared the involuntary memories from the diary study with voluntary memories retrieved in response to cue words (see Berntsen, 1998, for details). The cue words were generated to be comparable to the cues that had been recorded in the diary study of involuntary memories. Considerably more specific episodes were found among the involuntary memories as compared to the voluntary, word-cued memories (89 percent versus 63 percent). The involuntary memories were also rated as less rehearsed than the voluntary memories, and they were rated as dealing with slightly more unusual events (although the latter did not show statistical significance). In evaluating the unusualness of a remembered event, the participants were asked to consider the extent to which it was different from other experiences from the same period of their life, which agrees well with Hunt's (2006) definition of distinctiveness as "the processing of difference in the context of similarity" (p. 12). Further analyses showed that ratings of unusualness (distinctiveness) were the best predictor for whether the memories dealt with specific episodes (see Berntsen, 1998, for more details).

We followed up on these findings in a couple of studies (Berntsen and Hall, 2004). In one study, involuntary memories were compared to voluntary (word-cued) memories. Both the involuntary and voluntary memories were recorded in naturalistic settings via a self-paced diary procedure. Again the involuntary memories more frequently referred to specific episodes and the remembered events

were rated as significantly more distinctive than what was found for the voluntary memories. In another study, we wanted to examine whether the differences between the involuntary and the voluntary memories had to do with a difference between environmental versus verbal cues. We therefore compared voluntary memories recorded in response to word cues to *voluntary* memories recorded in response to environmental cues, using a memory walk technique developed by Francis Galton (1907). The participants were asked to walk around in their natural environment and at regular intervals stop and recall a voluntary memory in response to self-chosen features in the surroundings. Voluntary memories of this type did not differ from the verbally cued voluntary memories on any interesting dimensions. Again, further analyses showed that in both studies, memory specificity was closely related to ratings of distinctiveness. Recently, we replicated and extended these findings in a study involving involuntary versus voluntary, future versus past event representations. The involuntary memories and future representations more frequently dealt with specific episodes than their voluntary counterparts (Berntsen and Jacobsen, in press).

Other laboratories have also found a specificity effect (but see Rubin *et al.*, 2008b who used a different measure). Using a chaining technique to elicit involuntary memories in a laboratory setting, Mace (2006) replicated our finding of a higher frequency of specific episodes for involuntary than voluntary autobiographical memories. Schlagman and Kvavilashvili (2008) also replicated this finding using a different laboratory technique for eliciting involuntary autobiographical memories. Furthermore, in a diary study examining involuntary autobiographical memories among young and older participants, Schlagman *et al.* (2007) found that the younger and older participants recorded an equal number of specific episodes. This null finding is noteworthy because other studies examining only voluntary memory have found that older participants record less specific autobiographical information compared to younger participants (Levine *et al.*, 2002). When these findings are considered

together with Schlagman *et al.* (2007), they suggest that different mechanisms may be responsible for access to specific episodes in involuntary versus voluntary recall. This is consistent with the present view that in involuntary recall, memories of unique episodes are favored by the associative processes instigated by the cue, whereas the strategic reconstruction of such memories requires a more resource-demanding top-down search.

In addition, recent work has shown that the content of involuntary memories is regarded as less central to the person's life story and identity as compared to the content of voluntary autobiographical memories (Rubin *et al.*, 2008b). Thus the findings reviewed here are consistent with the assumption that memories for unique autobiographical events of limited relevance to our life story are underrepresented in voluntary relative to involuntary recall.

Evidence from a diary study involving involuntary versus voluntary memories of aversive pictures (Hall and Berntsen, 2008; see also Chapter 4) can be seen to further support these ideas in that pictures that were seen to immediately afford a narrative understanding of the depicted scene were more frequent among the voluntary than among the involuntary memories, whereas the non-narrative pictures were more frequent in the involuntary recall. The finding that "narrative" pictures were more frequent in voluntary recall is in line with the idea that relational processing is more decisive for subsequent voluntary recall, whereas the associative processes that enable involuntary recall are more dependent on the presence of some distinctive cue.

The emotional impact of involuntary memories

Some diary studies have included measures of the emotional impact of the memories at the time of recall (Berntsen and Hall, 2004; Rubin *et al.*, 2008b). In such studies the participants are asked to assess whether the memory influenced their mood and whether they had a physical reaction to the memories. These studies have

documented that involuntary memories more frequently than voluntary memories have an identifiable emotional impact and are followed by a noticeable physical reaction (e.g., laughing, crying, smiling, palpitation). Analyses reported by Berntsen and Hall (2004) suggested that the ability to exert an emotional effect is unrelated to the specificity and distinctiveness of the memories. What then may cause this difference between involuntary and voluntary memories?

A simple (but erroneous) explanation could be that involuntary memories generally access material that is more emotional than what can be accessed voluntarily and that they therefore are experienced as more emotional at recall. This explanation is contradicted by evidence from diary studies (reviewed in Chapter 4) showing that involuntary memories do not access events that are more emotionally intense than voluntary memories. For both kinds of memories, emotionally intense events are more easily accessed than less intense events. This was also confirmed in a study measuring emotional intensity at the time of encoding (Hall and Berntsen, 2008). Nor were differences observed between the two kinds of memories with respect to the emotional valence of the remembered events. Thus it does not seem useful to try to explain the differences between involuntary and voluntary memories in emotional reactions with reference to mechanisms operating at encoding (i.e., emotion at the time of the event). Instead, it seems more promising to consider the effect as a result of the different retrieval processes characterizing the two kinds of memories. In the following, two possible explanations are considered. One is based on the multiple levels theory of emotion; the other is based on emotion regulation theory.

Associative versus appraisal-based activation of emotion According to theories of multiple levels of emotion activation (e.g., LeDoux, 1996; Leventhal and Scherer, 1987; Power and Dalgleish, 1999) emotions can be activated associatively as well as follow more elaborate cognitive processes. The latter involves some conscious considerations of the personal significance of the stimulus in the

present context, whereas the former is a uniform and automatic emotional response to stimuli that have become associated with a particular reaction in the past, as in fear conditioning. For example, a person may associate the loss of a loved one with a piece of music played at this person's funeral. The music brings back not only the memory of the funeral, but also the intense sadness felt at the time. The associative reaction is involuntary and "modular" (Fodor, 1983; Power and Dalgleish, 1999, p. 135), and thus not open for cognitive reflections or conscious control. For these reasons, the associative emotional response may often be classified as an overreaction once the emotional stimulus has been more thoroughly evaluated. For example, if the person in our example starts to cry in response to hearing the same piece of music in a different context several months or years later, most people would find this reaction difficult to understand if they did not know the background. One possible explanation for the higher frequency of emotional reactions to involuntary memories (as compared to their voluntary counterparts) may be that involuntary memories more often involve such associative activations of emotions because of their inherently associative and uncontrolled retrieval.

For this explanation to work, the emotion at the time of the event should be the same as the emotion experienced at the time of recall. One problem with this explanation is, therefore, that sometimes a mismatch is seen between the original emotional reaction and the person's emotional reaction to the memory at the time of recall. Such mismatch is illustrated by the following example (female, twenty-six years):

The participant is in her kitchen making ice cream. It strikes her that if she eats too much ice cream it may eventually ruin her figure. She is, however, quite content. She is whipping the cream and enjoying the smell of vanilla when the following involuntary memory comes to her mind: "It was a summer day. My former boyfriend bought me an ice cream – a big 'Magnum.' We were in

Italy." She indicates on the questionnaire that the memory had a negative impact on her mood and made her cry.

At the time when it took place in the past, the episode with the ice cream was presumably not a negative experience. In fact, the participant rated it as moderately positive on the scale for emotional content. However, in the present context, when the memory comes to her mind it affects her mood negatively and makes her cry. This suggests that the emotional reaction is due to the person appraising the difference between the present situation (e.g., she is alone) and the remembered situation (e.g., the boyfriend was around), rather than simply reflecting an automatic activation of the original emotional reaction.

Both event-congruent and event-incongruent emotional reactions are observed in studies of involuntary and voluntary autobiographical memories. Event-congruent emotional reactions (i.e., emotional reactions that are congruent with the participants' retrospective ratings of the emotional valence of the event) are most frequent. A reanalysis of data from Berntsen and Hall (2004) showed that they accounted for around 80 percent of all cases involving a detectable emotional response at recall. No difference was found between voluntary and involuntary memories in this regard. However, the fact that 80 percent of the emotional responses were congruent with ratings of the valence of the original event does not imply that the memory simply reactivated the same emotional response as in the original event, which the associative emotion explanation seems to require *qua* its analogy to fear conditioning. For example, it would be perfectly possible to experience and maybe express anger in response to a memory of an event that originally involved a different negative emotion, such as sadness. This would still allow the reaction to the memory to be classified as congruent with the original emotion with respect to its *valence*, but not with respect to the specific emotional experience. To disentangle this issue, future research should conduct more fine-grained analyses on the emotional overlap between the

affective reaction at encoding and at recall. Thus associative activation of emotion can account for some but not all of the increased emotional reaction associated with involuntary recall.

Emotion regulation and involuntary versus voluntary memories Let us consider an alternative or supplementary explanation for why involuntary and voluntary memories differ in their accompanying emotional reactions. This explanation is based on the notion of emotion regulation and does not require the emotional response to the memory to be identical to the emotional response at the time of the event. Following Gross (2001), emotion regulation is “conscious and nonconscious strategies we use to increase, maintain, or decrease one or more components of an emotional response” (p. 215). The most efficient form of emotion regulation according to Gross (2001) is “antecedent-focused” emotion regulation. This refers to regulatory strategies that come into play before the emotional response tendencies (e.g., physiological responses) have become fully activated. A less efficient alternative is response-focused emotion regulation, referring to strategies that we can employ to suppress the expression of emotions that are already activated. One possible explanation of why involuntary memories are more frequently accompanied by an emotional reaction is that the former, because of their sudden and spontaneous nature, allow little time for antecedent emotion regulation. One important form of antecedent emotion regulation is to re-evaluate (or reappraise) a potentially emotional situation in such a way that it is less likely to influence us. Such re-evaluations are unlikely to precede involuntary memories, because they come unexpectedly, whereas voluntary retrieval may involve such antecedent-focused emotion regulation through the construction of the search description guiding the memory retrieval. For example, if the participant in the quoted example had been asked to voluntarily recall the scene in which her former boyfriend gave her an ice cream, she might have been able to reappraise the contrast between then and now well in advance of the memory (e.g., “well, we

had some good experiences, but since it didn't really work out for us, it is fine that we are no longer together"), which might have prevented her from reacting emotionally to the memory.

Both reduced emotion regulation and associative emotion activation may help to explain why involuntary memories on average exert more emotional impact than voluntary memories. As I shall argue in the next chapter, the fact that involuntary memories generally come with more emotional impact may help to explain highly emotional "flashbacks" after traumatic events.

INVOLUNTARY MEMORIES AS OBSERVED BY MARCEL PROUST

Let us end this chapter by considering whether the findings reviewed so far can help us understand artistic observations on involuntary autobiographical memories, notably the examples described by Marcel Proust. As mentioned in Chapter 1, some cognitive psychologists have made a sharp contrast between an artistic and scientific approach to mental events. For example, in the assessment of Miller (1962), Proust's personal observations on involuntary memories seemed to be "the complete antithesis of all what we have learned to call scientific (p. 180)". Clearly, Miller was right that a certain mystery has surrounded Proust's descriptions of his involuntary recollections, partly because of the way Proust himself described this phenomenon and the aesthetic qualities he associated with such memories. But is it really the case that they cannot be approached scientifically?

In *Remembrance of things past*, at least six spontaneous recollections are described, five in *Time regained* and one in *Swann's way*. Let us consider them pretty much in the order in which they are described in Proust's novel and see how they fit the categories in Table 6.2.

The first (and most frequently quoted) memory comes to mind on a dreary afternoon after the narrator's mother has served him a cup of tea together with a certain cookie known as a *petite madeleine*. When he dips the cookie in his cup and tastes a spoonful of the tea in

which he has soaked a piece of the cake, he immediately feels an “exquisite pleasure” filling him. The pleasure is not associated simply with the taste of the cake and the tea *per se* but (it turns out) with the activation of a long-forgotten childhood memory. After a couple of minutes, he realizes that “the taste was that of the little crumb of madeleine which on Sunday mornings at Combray . . . when I went to say good day to her in her bedroom, my aunt Léonie used to give me, dipping it first in her own cup of real or of lime-flower tea” (Proust, 1928/1956, p. 65). This particular memory is followed by a series of memories of the associated setting – the grey house in which the aunt lived, the garden, the town, the town square, the streets, and the country roads leading away from the town.

The memory elicited by the mixed taste of the tea and madeleine cookie can be considered a case of cue underload (category 1 in Table 6.2). The narrator explains that although he has frequently seen madeleine cookies displayed on trays in the bakeries, he had apparently not tasted any in the interval. Thus, the madeleine memory satisfies the criteria for category 1 (Table 6.2) in terms of an infrequent feature (the mixed taste of tea and *petite madeleine*) triggering a memory of an event in which this same infrequent feature plays a part. It is noteworthy that at the time of the event, the mixed taste of tea and madeleine was not an uncommon stimulus, since the narrator seems to have encountered it on almost all his Sunday morning visits to his aunt during this particular period of his life. Probably for that reason, the memory that comes to his mind is not of a specific episode but a general event summarizing these reinstated characteristics of his visits to Aunt Léonie. However, the other five memories to be considered here are all of specific events, consistent with the dominance of specific events generally found for involuntary memories, as reviewed earlier.

These five memories all come to his mind towards the end of the novel, when the narrator is attending an afternoon party at the Prince de Guermantes. Sitting in the carriage on his way to the mansion of the Guermantes he seems to have a forewarning of these

memories that one after the other soon will enter his awareness: "Like an aviator who rolls painfully along the ground until, abruptly, he breaks away from it, I felt myself being slowly lifted towards the silent peaks of memory" (Proust, 1949, p. 200). We shall later dwell upon exactly what might cause this mystical, almost divine, joy that the narrator associates with these spontaneously emerging memories, but let us first take a look at how they come to his mind. The first of the five memories is brought to mind in the courtyard of the Guermites' mansion when he has to step quickly backwards to avoid an approaching carriage. During this movement, he stumbles against some unevenly placed paving stones and when he recovers his balance, he is standing with one foot upon a flagstone that is higher than the one his other foot is resting on. He feels the same deep joy and reassurance as when he tasted the *petite madeleine*. A moment later the relevant memory comes to his mind. He recalls a particular moment when he was standing on two uneven paving stones in the baptistery of St. Mark's in Venice. Applying the categories of Table 6.2 to the activation of this memory, it seems that it is best categorized as an instance of *distinctiveness* (i.e., category 3 in Table 6.2): A common feature (standing on uneven paving stones) activates a memory in which this common feature is placed in a novel/distinctive context (the baptistery of St. Mark's in Venice).

The same classification appears to apply to the next couple of memories that come to him at the Guermites' place. A servant shows him into the library, where he is asked to wait to enter the party until a piece of music that is being played has come to an end. He is given refreshments and while he wipes his mouth with a starched napkin he suddenly remembers his first day at Balbec, a seaside resort at which he spent his summers as an adolescent and where he met his love, Albertine. The moment he recollects is the moment when he is trying to dry himself with a similarly stiff towel, facing the window overlooking the sea on the day of his arrival and shortly before he meets Albertine. Thus the stiff napkin (which is likely to be a relatively frequent encounter) activates a memory in

which this presumably common feature is placed in a novel/distinctive context (i.e., first day at Balbec). A few minutes later in the library, he notices “the strident sound of a water-pipe, exactly like those long screeches which one heard on board excursion streamers at Balbec” (Proust, 1949, p. 219). This is followed by a recollection of a specific moment in the dining room on a summer afternoon at the Balbec resort in which he sees Albertine walking with her friends outside on the sea front and realizes that he can join them simply by stepping across the low frame of the open bow-window. Again, we might consider this an instance of category 3 in Table 6.2 if we assume that the cue was a relatively common sound at the time. If so, a common feature (the sound of the water-pipe) is followed by a memory in which this sound is placed in a distinctive context.

An instance of cue underload (i.e., category 1 in Table 6.2) appears to be contained in the next memory that comes to his mind in the Guermantes’ library. He inattentively opens one of the books in the library and realizes that it is a specific novel by George Sand to which he has not devoted any attention since his childhood. He recollects a night during his childhood when his mother read this book aloud to him almost until morning. So far, all the examples can be seen to fit one of the first three categories of Table 6.2 – that is, the categories that I argued were specifically important to our understanding of involuntary autobiographical memories and the same categories that we also frequently observed among the involuntary memories of the female participant whose memories were analyzed earlier in this chapter. However, there is at least one exception: when the narrator enters the library at the Guermantes’ mansion, the servant accidentally knocks a spoon against a plate, which brings back a moment experienced during a train ride the day before at which time he had heard the noise of a railwayman’s hammer against the steel wheel of the train. This memory appears to be an instance of category 5 in Table 6.2: A redundant cue activates a memory that is more accessible than others as a result of its recency and maybe also because of emotion, since he had felt very sad during

this particular train ride the day before, believing that he had no artistic talent and no enthusiasm for art.

Proustian and everyday involuntary memories

As it appears, the involuntary memories described by Proust have many similarities with the involuntary memories that have been recorded by psychology students in diary studies. First, we find a dominance of specific episodes. Second, the memories often involve distinctive features that have enabled their activation through specific cues in the environment or thoughts (corresponding to categories 1–3 in Table 6.2). Third, the memories come to mind in situations that are not attention demanding (e.g., waiting to enter a party). Fourth, the memories that come to mind are often not a central and frequently considered part of the person's life story. We observed this for the psychology students' memories in term of lower ratings of life-story relevance of the involuntary as compared to voluntary autobiographical memories. In Proust's case, the remembered episodes typically had not been considered for a long time, according to his narrator's account, and clearly were not part of the (disillusioned) life story that he would tell based on the memories that he would be able to bring to mind through goal-directed retrieval. Fifth, some diary studies (Ball and Little, 2006; Berntsen, 1998) have found very low ratings of rehearsal of involuntary memories, although others have not (e.g., Berntsen and Hall, 2004). Infrequent rehearsal agrees with Proust's descriptions in that his protagonist's memories appear to have been dormant for many years. According to the descriptions, they have not been thought about or talked about in the meanwhile, and indeed, as I shall argue shortly, this is a key to understanding the unique joy that they are able to bring him. Sixth, in the diary studies as well as in the case of Proust, the involuntary memories show a stronger ability than voluntary memories to affect the person emotionally. As mentioned earlier, in diary studies we find more emotional reaction and mood impact of involuntary than voluntary memories (Berntsen and Hall, 2004; Rubin *et al.*, 2008b), and in the

case of Proust, the activation of the memories are accompanied by a deep happiness. The fact that joy uniformly follows (indeed, in some cases even precedes) the memories described by Proust makes them different from the involuntary memories in the diary studies, since the latter are associated with both negative and positive emotional impact. There is one other important difference between the involuntary memories recorded by psychology students and those described by Proust. The latter generally deal with remote events that have been little rehearsed in the meantime. Although such memories can also be found among the involuntary memories recorded in diary studies, they seem to be relatively rare. When people are asked to record their first two involuntary memories each day in a diary study, recent events clearly dominate (see Chapter 4).

Why would memories of remote and seldom rehearsed events uniformly be followed by intense joy in Proust's case? Obviously, it is not simply a reactivation of the original emotions, since the content of the memories is not necessarily happy. In order to understand this, a number of observations have to be considered. First, because the memories have not been activated and reconsidered, they have not become recontextualized in a life-narrative context. They have been left dormant, we may say, in that original associative network that formed their mental context at the time of encoding. This is crucial, according to Proust. When they then suddenly become active, triggered by a random cue, they are themselves able to serve as a cue for other memories belonging to the same original setting. This is clear in the case of the memory activated by the *petite madeleine*. The memory of the Sunday visits to the aunt serves as a trigger for its temporal setting: "immediately the old grey house, where her room was, rose up like the scenery of a theatre to attach itself to the little pavilion opening to the garden . . . and with the house the town, from morning to night and in all weathers, the Square where I was sent for luncheon, the streets along which I used to run errands, the country roads we took when the weather was fine (Proust, 1928/1956, pp. 65–6). A similar spreading

activation is observed following the memory of the moment inside the baptistery of St. Mark's in Venice. The narrator's memory of this moment is "linked with all the other sensations of that and other days which had lingered expectant in their place among the series of forgotten years from which a sudden chance had imperiously called them forth" (Proust, 1949, p. 211). Because the memories are able to activate great chunks of what seems to be the original context or setting of the event, they appear to the narrator to be activating entire past selves: "The impression was so strong that the moment I was living seemed to be one with the past" (Proust, 1949, p. 213), he says about the memory of the first day at the Balbec resort, activated by the sensation of the stiff napkin. And in response to the memory of the George Sand novel that his mother had read to him, he observes: "Immediately a child rises within me and replaces me, who alone has the right to read that title, François le Champi, and who reads it as he read it then with the same impression of the weather out in the garden, with the same old dreams about countries and life, the same anguish of the morrow" (Proust, 1949, p. 234). The activation of these past selves and long-gone settings fills him with intense joy, not because the original event was happy, but because he takes them to testify that he is an extra-temporal being: "Of a truth, the being within me which sensed this impression, sensed what it had in common in former days and now, sensed its extra-temporal character, a being which only appeared when through the medium of the identity of present and past, it found itself in the only setting in which it could exist and enjoy the essence of things, that is, outside Time" (Proust, 1949, p. 216).

What Proust describes here may be considered as an extreme form of mental time travel – considered a defining feature of episodic memory (Tulving, 2002). In fact the intense sensitivity that Proust appears to demonstrate in relation to the ability to mentally travel through time may be considered an important part of his artistic talent – a connection he also makes himself, albeit with different words.

Given this view, it makes sense that the narrator in Proust's novel has little respect for voluntary autobiographical recall. He describes voluntary recall almost with contempt: "I did not stop to consider the extreme difference which there is between the true impression which we had of a thing and the artificial meaning we give to it, when we employ our will to represent it to ourselves" (Proust, 1949, p. 213; consider also the quotation at the beginning of this chapter). He thinks little of voluntary recall because it is unlikely to give access to these long-forgotten scenes that, in turn, are able to activate what seems to him as the original setting and "atmosphere" of the experience. This view can be seen to agree with my claim that because goal-directed recall employs search descriptions generated from generic autobiographical knowledge it is more likely than involuntary recall to favor events that are seen as representative for our lives and current conceptions of ourselves and have a frequently contemplated role in our life story. Such memories that are part of what we may call the standard edition of our life story are lifeless, according to Proust. They are too contemplated, too well-known, and simply lead down too well-trodden paths of memory to have any real existential and artistic value. The past is not really revived and relived in them, according to Proust. It is replaced. In his artistic view, the past in its uniqueness only survives in memories that were left unconnected with our current conception of ourselves and have escaped the life-story narrator's restless efforts after meaning. Using the terms from laboratory memory research employed earlier in this chapter, item-specific rather than relational processing is essential for the maintenance of such Proustian memories:

If a memory, thanks to forgetfulness, has been unable to contract any tie, to forge any link between itself and the present, if it has remained in its own place, of its own date, if it has kept its distance, its isolation in the hollow of a valley or on the peak of a mountain, it makes us suddenly breathe an air new to us just because it is an air we have formerly breathed. (Proust, 1949, p. 215)

It should be noted that this Proustian view of autobiographical memory is in contrast with a highly dominant view among autobiographical memory researchers – a view emphasizing life-story relevance as a prerequisite for the maintenance and reactivation of autobiographical memories. For example, according to Conway (2005) information pertaining to specific events is “only retained in a durable form if [these events] become linked to conceptual autobiographical knowledge. Otherwise they are rapidly forgotten” (p. 613). A similar view is expressed by Nelson (1993): “Adults may need to be reminded that not all episodic memory is autobiographical memory. In the simplest example, what I ate for lunch yesterday is today part of my episodic memory, but being unremarkable in any way, it will not, I am quite sure, become part of my autobiographical memory – it has no significance to my life story beyond the general schema of lunch” (p. 357–8).

The emphasis on life-story relevance (and thus relational processing) is likely to be an exaggeration. Life-story relevance is only one of several means for long-term maintenance of personally experienced events. Other mechanisms may be the presence of distinctive and novel (but not necessarily life-story relevant) features. As even Bartlett (1932) observed “The persistence of certain kinds of novel details is an undoubted fact” (p. 107). Indeed, he observed: “. . . that curious preservation of the trivial, the odd, the disconnected, the unimportant detail” (p. 184).

Autobiographical memory researchers may have been biased by the extensive use of voluntary recall in studies of autobiographical memory. As we have seen here, a somewhat different picture emerges when the content of involuntary memories is taken into consideration. Obviously, the findings reviewed in this chapter cannot be taken to suggest that all, or even the majority of, involuntary autobiographical memories are such miraculously revived memories of apparently long-forgotten scenes, as described by Proust. Findings from diary studies show that such involuntary memories are quite

rare. However, it seems reasonable to argue that the likelihood of coming across such memories is greater for involuntary than for voluntary recall. In that sense, Proust was right. It may be "a labor in vain" to try to recapture such long-forgotten moments through a voluntary retrieval strategy.

7 Involuntary memories of traumatic events

Despite their wishes for peace of mind, trauma victims frequently experience repeated, unbidden memories of the traumatic event . . . these spontaneously arising memories are virtually the signature of post-traumatic stress.

(Harber and Pennebaker, 1992, p. 359)

In the spring of 1945, the Royal Air Force bombed Gestapo headquarters in Copenhagen. On their way in, the English planes had to maintain a very low altitude in order not to be detected by the German military. This was particularly hard because of poor weather conditions. One of the planes did not make it. It crashed and exploded with its load of bombs in a residential area of Copenhagen. Some of the planes that followed mistook the heavy smoke from the crashing airplane to indicate the target and consequently dropped their load of bombs over the same neighborhood. A school was completely destroyed, as were several apartment buildings in central Copenhagen. A seventy-seven-year-old woman who was a schoolgirl at the time witnessed the collapse of apartment buildings next door:

Suddenly, we heard a bomb, the alarm rang, we had to run to the basement. Our classroom was up high and we rushed down the backstairs. While we were running, we saw the apartment buildings on Maglekildevej crash. It looked like a movie, but it was real.

Fifty-six years later, on September 11, 2001, this woman watches the collapse of the World Trade Center on television. She explains that she reacted “with very unpleasant physical symptoms: I was trembling, I had strong pains in my stomach and I was on the edge of a depression. I constantly saw the World Trade Center towers

and [the apartment buildings on] Maglekildevej as one single event" (see Berntsen, 2005; Berntsen and Thomsen, 2005, on older Danes' memories from World War II).

People who have lived through traumatic or highly stressful events often have memories they would like to, but cannot, forget. The memories are intrusive, stressful, highly vivid, and uncontrollable. Such stressful involuntary memories are observed in relation to many psychiatric diseases. They have received most attention in relation to the disease Posttraumatic Stress Disorder (PTSD), of which they are considered a distinctive symptom (American Psychiatric Association, 2000), as also illustrated by the quotation that opens this chapter.

The DSM-IV-TR defines PTSD as a syndrome that may follow the experience of a traumatic event. The diagnosis lists a number of possible re-experiencing symptoms, including "recurrent and intrusive distressing recollections" and "recurrent distressing dreams" of the traumatic event (American Psychiatric Association, 2000, p. 468). In order to be diagnosed with PTSD, the person has to also show symptoms of avoidance (such as avoidance of reminders of the event) and increased arousal (such as difficulties concentrating).

Several theories of PTSD have focused on the role of involuntary memories for the development and maintenance of this disorder. Such theories have claimed that there are important differences between involuntary and voluntary recall of traumatic memories and that it is crucial to provide an explanation of these differences in order to explain key characteristics of the disorder. However, this argument relies to a large extent on isolated studies or observations within clinical populations, and usually fails to consider findings on involuntary memories in everyday life. Even though highly emotional involuntary memories are an indisputable fact in PTSD, it is by no means clear how they should be explained. The purpose of the present chapter is to review the theoretical ideas that dominate the field and the findings that support them. Rather than arriving at definite conclusions, such an overview and discussion can be a useful

starting-point for developing more systematic research. In the second half of the chapter, I will develop my own theoretical view of involuntary traumatic memories based on what we know about involuntary autobiographical memories in everyday life.

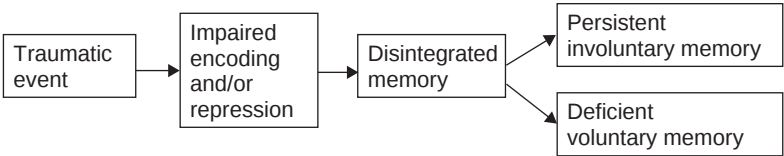
TWO OPPOSING VIEWS

Involuntary recollections of the traumatic event are a well-established fact in PTSD, but so are involuntary memories in everyday life. The key question that we need to address in this chapter is therefore whether two theories are required, one for each phenomenon, or whether one can do the job. In other words, are involuntary autobiographical memories essentially the same phenomenon that just expresses itself differently depending on the past experiences and present life circumstances of the individual, or are involuntary memories of traumatic events fundamentally different from involuntary autobiographical memories in everyday life?

As demonstrated in Chapter 4, involuntary memories in daily life deal with both positive and negative material, recent and remote events, and generally show the same characteristics as voluntary autobiographical memories with regard to factors related to encoding and maintenance. As we saw in Chapters 5 and 6, such everyday involuntary memories come with more mood impact and more emotional reaction than their voluntary counterparts and typically deal with specific episodes involving some distinctive elements that have enabled the activation of the memories through cues in the environment or thought. The question is whether these characteristics can be extrapolated to account for involuntary memories after traumatic events or whether special mechanisms are required. The two views are depicted in Figure 7.1.

One important difference between the two theoretical views is whether the encoding of the traumatic event affects subsequent accessibility differently for involuntary versus voluntary recall. According to many theories advocating the special mechanisms view, traumatic events are encoded in such a manner that they become

The Special Mechanisms View



The Basic Mechanisms View

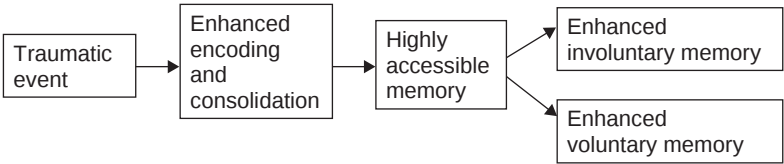


Figure 7.1. The special mechanisms vs. the basic mechanisms view of how traumatic events influence voluntary and involuntary recall.

highly accessible for involuntary recall but at the same time very hard to access through voluntary recall, as illustrated by the top panel in Figure 7.1. This view is summarized by Halligan, Clark, and Ehlers (2002) as a “pattern of poor intentional recall and easy triggering of involuntary memories” (p. 74). The underlying idea is that the traumatic event disrupts normal processing as a result of its intense emotion and violation of schema-based expectations. This disruption is often described as a dominance of sensory and perceptual impressions relative to verbal and conceptual information (e.g., Holmes and Bourne, 2008). As a consequence of the deficient encoding, the trauma becomes poorly integrated into the autobiographical knowledge of the person; it may be completely or partly dissociated, for which reason it will be hard to access through voluntary recall. According to this view, voluntarily retrieved memories will often be “vague, disorganized and full of gaps” (Brewin and Holmes, 2003, p. 358). However, the likelihood of recalling the traumatic event involuntarily is enhanced for exactly the same reasons, according to this view. The involuntary memories are often associated with

strong emotions and vivid sensory imagery that are hard, if not impossible, to access through voluntary recall (e.g., Brewin and Holmes, 2003; Ehlers and Clark, 2000). Although this often goes unnoticed (but see Horowitz, 1969a, 1986), the special mechanisms view is in some respects similar to Freud's ideas of pathogenic trauma memories (see Chapter 2). Shortly, I present a more detailed description of theories representing this view.

The special mechanisms view has received strong criticism for the claim that trauma memories are stored in ways that render them difficult or even impossible to access through voluntary recall (e.g., Kihlstrom, 2006; Loftus, 1993; McNally, 2003; Shobe and Kihlstrom, 1997). Consistent with neurobiological research showing that emotional arousal enhances rather than impairs memory (e.g., Dolcos *et al.*, 2004, 2005; McGaugh, 2004), behavioral studies have showed that trauma memories are usually highly accessible for voluntary recall (Geraerts *et al.*, 2007; Merckelbach *et al.*, 2003a, 2003b; Porter and Birt, 2001; Rubin, Feldman, and Beckham, 2004), and that strategically retrieved traumatic memories are often more vivid and sensorily clear among participants with than without a PTSD symptom profile (Berntsen, Willert, and Rubin, 2003; Megías *et al.*, 2007). Brandon *et al.* (1998) conclude from a review of the clinical research literature: "The problem following most forms of trauma is an inability to forget, rather than a complete expulsion from awareness, and amnesia for violent events is rare" (p. 298).

While the claim of deficient voluntary access has caused heated dispute in the so-called recovered memory controversy (e.g., Conway, 1997), the implications of the model for involuntary recall have gone largely unchallenged. That is, hardly anyone has challenged the idea that involuntary trauma memories derive from impaired processing and/or dissociation of the traumatic experience (but see Berntsen, 1996, 2001; Hall and Berntsen, 2008). However, from a more general view of memory, it appears unlikely that two different kinds of explicit episodic memory would show markedly dissimilar effects in response to the same event (e.g., Roediger, 2008). Moreover, the

assumption that faulty encoding may lead to enhanced explicit memory – in terms of an increased frequency of involuntary autobiographical memories with strong conscious reliving – is counter to what we know about the relation of attention and explicit memory in general (e.g., Craik *et al.*, 1996; Mulligan, 1998).

The basic mechanisms view (bottom panel of Figure 7.1) is derived from the episodic memory theory of involuntary memories (Chapter 2). This view questions the central assumption of the special mechanisms view that the encoding of the traumatic event has differential effects on voluntary versus involuntary access to the memory. Instead this alternative model assumes that the emotional arousal and novelty of the traumatic event will enhance encoding overall and thereby enhance subsequent access for both voluntary and involuntary recall. This is consistent with numerous studies (mentioned earlier) showing that voluntary memory for traumatic events is not impaired compared to memories of more mundane events. The model derived from the episodic memory theory of involuntary autobiographical memories is also consistent with the findings reported in Chapter 4 that voluntary and involuntary memories appear to follow the same overall pattern regarding factors that are known to affect encoding and maintenance (such as emotional arousal at the time of the event). However, because the findings reviewed in Chapter 4 generally dealt with involuntary memories for non-traumatic events, they do not rule out the possibility that something different may be at stake with involuntary memories of traumatic events. In the following, I review theories that represent the special mechanisms view as well as their evidence. I then consider the alternative model in more detail and discuss how this model may explain well-known characteristics of involuntary memories of traumatic events.

SPECIAL MECHANISMS THEORIES OF INVOLUNTARY TRAUMA MEMORIES

Theories representing the special mechanisms view of involuntary trauma memories follow Freud's idea that an event becomes

traumatic because it exceeds the processing capacity of the person (see Chapter 2). This view has been extended to explain conscious involuntary memories of traumatic events, although such unbidden conscious memories in waking life played little role in Freud's work. According to special mechanisms theories, intrusive memories after traumatic experiences essentially derive from an impaired processing and encoding of the event. As a consequence, access through voluntary retrieval is severely reduced whereas involuntary access is enhanced, as depicted in Figure 7.1. The theories differ with respect to their more detailed explanations of this effect.

Active memory storage

One of the pioneers in research of PTSD whose work had an enormous impact on the design of the diagnosis is the psychiatrist Mardi J. Horowitz. He acknowledges that his view of intrusive memories of traumatic events is clearly influenced by Freud (see for example Horowitz, 1969a, 1986) as mentioned in Chapter 2. Freud (1919) speculated that the key feature of war neurosis was an incompatibility between the old self-schemata (Ego structures) from the time before the war and new ones that had developed after the war. Similarly, according to Horowitz (e.g., 1969a, 1975, 1986), symptoms of PTSD derive from an incompatibility between the person's existing schemata and the traumatic event. As a result of this incompatibility, the event cannot be sufficiently processed, for which reason it is kept in an "active memory storage" with an inherent tendency to automatically repeat its own content in consciousness until processing has been completed. In terms of cognitive psychology (Schacter, Wagner, and Buckner, 2000) the active memory storage is a separate memory system with a dedicated function. The repeated involuntary reactivations of the traumatic memory are assumed to help in integrating memory of the traumatic event with pre-existing schematized knowledge. The involuntary activations are, however, counteracted by attempts at avoiding the traumatic material, leading to fluctuations between periods with intrusions and

periods with avoidance (Horowitz, 1986; Horowitz and Reidbord, 1992). If the avoidance mechanisms are sufficiently strong, the stressful material may never be fully processed, thus intrusions will continue as in chronic PTSD. Horowitz (1986) assumed that intrusive memories observed in response to milder aversive stimuli reflect the same general stress response mechanism as intrusive memories after traumatic events.

Situationally and verbally accessible memories

According to Chris Brewin and his colleagues (Brewin *et al.*, 1996b), recurrent intrusive memories after a traumatic event are accounted for by their own memory system: a "Situationally Accessible Memory" (SAM) system. This separate memory system is limited to material that can be accessed only involuntarily through situational cues. The counterpart to the SAM system is a "Verbally Accessible Memory" (VAM) system, which includes material that was consciously processed during encoding, for which reason it can be accessed in a voluntary, goal-directed fashion and described verbally. Both systems deal at least in part with conscious recollections and do not map on to the memory systems that have been proposed more broadly in memory research, such as episodic versus semantic memory (Tulving, 1972) or declarative versus procedural memory (Cohen and Squire, 1980), but cut across such distinctions. The SAM system usually dominates after a traumatic or stressful experience, because the high arousal and schema-violation of the trauma reduces higher-order cognitive processing and thus increases storage in the SAM system. In order for the person to recover, the intrusive material in the SAM system has to become re-encoded in the VAM system. This can happen if the person focuses on the content of his or her intrusions, rather than tries to avoid them. This re-encoding has to be repeated "numerous times, because there may be a lot of extra information about the trauma in the SAM system that has to be transferred to the VAM system" (Brewin and Holmes, 2003, p. 359). Unlike memories that can be recalled voluntarily through the VAM

system, involuntary memories recalled through the SAM system “are not altered in any way but remain intact and may be vividly experienced again in the future” (Brewin and Holmes, 2003, p. 359). Thus, the traumatic memories elicited through the SAM system may often be exact duplicates of one another.

One characteristic of the SAM system is particularly noteworthy when evaluated against general research on memory. Although this system involves conscious recollections, it stores only material that was not fully consciously processed at the time of the event, such as emotions, bodily sensations, or fragments of perceptions that the person did not fully attend to at the time of the event. This is a radical idea that contradicts what is generally known about attention during encoding and subsequent memory (e.g., Craik *et al.*, 1996; Mulligan, 1998). Numerous laboratory studies have shown that divided attention during encoding substantially reduces (not enhances) explicit memory and also most forms of implicit memory (Mulligan, 1998). The opposite claim appears to have been supported only in one published study conducted by Brewin and colleagues (Holmes *et al.*, 2004) which I will describe later. Even though Brewin, Dalgleish and Joseph (1996b) attempt to make connections with modern cognitive psychology, characteristics of the SAM system regarding the relation between attention and memory seem in better agreement with ideas originally expressed by Freud (1920a):

Consciousness is not the only distinctive character which we ascribe to processes in that system [the perceptual system]. On the basis of impressions derived from our psycho-analytic experience, we assume that all excitatory processes that occur in *other* systems leave permanent traces behind them which form the foundation of memory. Such memory-traces, then, have nothing to do with the fact of becoming conscious; indeed, they are often most powerful and most enduring when the process which left them behind was one which never entered consciousness (pp. 24–5).

Data-driven processing and poor integration

In their theoretical model of PTSD, Ehlers and Clark (2000) reiterate the idea of a dissociation between voluntary and involuntary access to the traumatic event so that involuntary access is enhanced whereas voluntary access is impaired. Their account of intrusive trauma memories shares the assumptions of Freud (1920a), Horowitz (1975, 1986) and Brewin *et al.* (1996b; see also Brewin and Holmes, 2003) that recurrent involuntary memories are ways of elaborating the trauma and that such memories are associated with attempts of avoidance. While voluntary memory is hampered, the likelihood of activating the traumatic memory involuntarily is increased for several reasons. First, because the memory is poorly integrated, higher-order knowledge structures are unable to inhibit automatic, associative activations of the memory as they are claimed to do under normal circumstances (see Conway and Pleydell-Pearce, 2000, for a similar suggestion). Second, traumatic material is assumed to form particularly strong, associative links, which render involuntary memories much more likely after traumatic experiences than after more mundane events. Third, also contributing to enhanced frequency of involuntary memories is a strong perceptual priming for stimuli that were temporally associated with the traumatic event, so that such stimuli frequently act as cues for intrusive memories of the event.

In addition, Ehlers and colleagues observed that the majority of recurrent trauma memories are about stimuli that have acquired the status of a warning signal (Ehlers *et al.*, 2004, for review). A warning signal is defined as “stimuli that were present immediately before the traumatic event happened or shortly before the moment that had the worst emotional impact” (Ehlers *et al.*, 2002, p. 995).

The three theories considered here were chosen because they are all particularly concerned with involuntary memories of the traumatic event. However, very similar views are found in other contemporary theories of PTSD, such as theories for which dissociation is crucial for the development of intrusive memories (e.g., van der Kolk and Fisler, 1995). The theories are indebted to earlier work

on trauma and memory (notably the work by Freud reviewed in Chapter 2) which they have extended and attempted to integrate with modern cognitive psychology. In spite of this effort, they seem to have failed to consider several well-established and important findings, in particular the finding that material that is novel and violates our schemata is usually remembered very well (Hunt and Worthen, 2006), as well as findings showing enhanced (not impaired) encoding and recall of emotional information (e.g., Dolcos *et al.*, 2004, 2005; McGaugh, 2004). I will return to this and similar problems when describing the alternative basic mechanisms view in Figure 7.1 in more depth.

EMPIRICAL EVIDENCE FOR THE SPECIAL MECHANISMS VIEW

In order to examine the theories of involuntary trauma memories described so far, one ideally has to compare the eight conditions that occur when the following distinctions are intersected: traumatic versus non-traumatic event by involuntary versus voluntary recall by PTSD versus non-PTSD population. Also, in order to examine how traumatic stress experienced at encoding is related to memory characteristics measured at recall, measures of subjective reactions should be obtained both at encoding and recall. Unfortunately, the field is nowhere near meeting these (admittedly challenging) requirements (but see Rubin *et al.*, 2008b). Most of the theoretical arguments appear to be based on clinical observations, and experimental research on involuntary trauma memories is scarce, although some studies have been conducted. The following detailed review (from here to the section “Empirical evidence for the basic mechanisms view”) is needed to show why the evidence often cited in support of the special mechanisms view can be disputed.

Studies in naturalistic settings

In a much-cited study, van der Kolk and Fisler (1995) interviewed forty-six people recruited through local newspaper advertisements

asking for people who were “haunted by memories of terrible life experiences” (p. 514). The participants were interviewed about both their involuntary trauma memories and memories of non-traumatic (control) events, such as graduations, birthdays, and weddings. Most of the trauma memories referred to childhood experiences. According to van der Kolk and Fisler’s findings, the involuntary trauma memories differed markedly from other autobiographical memories. Van der Kolk and Fisler observed that:

Subjects considered most questions related to non-traumatic memory nonsensical: none had olfactory, visual, auditory, kinesthetic reliving experiences related to such events as high school graduations, birthdays, weddings, or births of their children . . . *Environmental triggers did not suddenly bring back vivid and detailed memories of these events* (p. 517, emphasis added).

Van der Kolk and Fisler’s findings are surprising for at least two reasons. First, it is well established that autobiographical memories of important non-traumatic life events are usually associated with sensory imagery and a sense of reliving (e.g., Brewer, 1996; Rubin, 2006; Wheeler *et al.*, 1997), contrary to van der Kolk and Fisler’s observations. Second, we know from diary studies on involuntary autobiographical memories that environmental triggers indeed often bring back vivid and detailed memories of positive, non-traumatic events (see Chapter 4), in contrast to what van der Kolk and Fisler (1995) found. Even among students with a PTSD symptom profile, only a minority of involuntary memories recorded in a diary study referred directly to traumatic events. In fact, roughly half of the involuntary memories were rated as positive (Berntsen, 2001; see also Chapter 4). The inconsistencies between these and van der Kolk and Fisler’s (1995) findings can have many explanations. Maybe van der Kolk and Fisler’s participants were so troubled by their traumatic memories that they overlooked experiences they had had with other types of involuntary memories when making their retrospective

assessments during the interviews. It could also be that the interview setting and the way the participants were recruited rendered them less likely to acknowledge the occasional occurrence of non-traumatic involuntary memories in their everyday life. Or maybe their assessments were in fact completely correct, although this would be surprising given what we know about involuntary autobiographical memories from other studies. On the basis of the method used by van der Kolk and Fisler (1995) and the details provided, it is impossible to decide in favor of any of these explanations.

Although emotionally negative involuntary memories are a defining symptom only for acute stress disorder and PTSD (American Psychiatric Association, 2000), distressing involuntary memories are also frequent in depression, as documented by Kuyken and Brewin (1994). They interviewed fifty-eight depressed women, of whom thirty-five reported a history of childhood sexual abuse. Thirty of the thirty-five abused women reported that they had had intrusive memories of abuse-related episodes during the week prior to the interview. A number of studies have followed up on these findings and examined frequency and characteristics of intrusive involuntary memories in depression (see Brewin, 1998, for a review). On the basis of these studies, Brewin (1998) concludes: "although they [intrusive involuntary memories] are present in non-clinical samples, they are much more common in patients with depression or PTSD" (Brewin, 1998, p. 359). In order to evaluate this statement, it is important to note that the participants in these studies were limited to reporting only involuntary memories with a *negative* emotional content. If involuntary memories follow the same pattern as voluntary autobiographical memory (e.g., Williams, 1992; see also Chapter 4), we should expect involuntary memories with a negative content to be more frequent in depressed patients than in non-depressed controls. This is generally consistent with the findings (Brewin *et al.*, 1998; Reynolds and Brewin, 1999; see also Chapter 2). The findings therefore parallel those reported on voluntary memories in depressed people (e.g., Williams, 1992, for a review). They do not suggest a need for special mechanisms.

In order to examine the involvement of the SAM memory system (Brewin *et al.*, 1996b) for the occurrence of highly vivid involuntary memories, Hellawell and Brewin (2002, 2004) instructed PTSD patients to write narratives of their traumatic event. While they were writing, the participants indicated if they suddenly experienced a state of flashback, and after finishing writing they were asked to look through their narrative and indicate periods with flashback. Flashbacks were defined as “a type of memory that you experience as markedly different from those memories of the event that you can retrieve at will. The difference might be a marked sense of reliving of the traumatic experience[s]” (Hellawell and Brewin, 2002, p. 1148). This reliving could be either complete or partial. Participants were also informed that flashback might involve reacting to the memory as if it was happening in the present. While writing, the participants’ physiological and overt behavioral reactions were observed and recorded by the experimenter.

Hellawell and Brewin (2002) found that periods with flashback were followed by impaired performance on a visuospatial task, whereas they found no difference on a verbal task. They interpreted this as partial evidence that the SAM system is involved with the production of flashbacks, because this system is assumed to be engaged in visuospatial processing. In addition, periods with flashback were associated with more overt behavioral reactions, more sensory (especially visual) details, more use of present tense and more mentions of death and fear, horror and helplessness. However, these findings can be seen as circular, since the participants were informed as part of the instructions that flashbacks involve more reliving and overt reaction than other memories. Thus when identifying periods associated with flashback, the participants were looking for periods associated with these characteristics. Furthermore, subjective measures of reliving have been found to be associated with visual imagery and emotion in several studies of voluntary and non-traumatic autobiographical memory (Rubin, 2006; Rubin *et al.*, 2003). It therefore seems probable that the periods with

flashback in Hellawell and Brewin's (2002, 2004) study were simply periods with highly vivid voluntary memories, especially since the instruction to write a narrative is a voluntary memory instruction.

The studies reviewed so far have used interviews and retrospective reports of involuntary negative memories. Because the latter involve strategic retrieval of past incidences of having intrusive memories, this seems to conflict with the idea that such memories are hard to access through voluntary recall. It therefore seems paradoxical that this method has been frequently used by proponents of the special mechanisms view. Another way to examine involuntary trauma memories is to use diary studies in which records are taken immediately when the memories spontaneously occur in daily life. As mentioned in Chapter 3, this is likely to reduce biases caused by retrospection (Nisbett and Wilson, 1977). Using a structured diary method in a sample of students with a PTSD symptom profile, I compared involuntary memories of the participants' most traumatic event against involuntary memories for other events recorded by the same participants during the diary period (Berntsen, 2001). The traumatic memories came with more emotional reliving and were rated higher on a number of measures addressing rehearsal and importance than the involuntary memories of other events. Also, the traumatic events appeared to be more accessible for involuntary recall than memories of peak experiences (i.e., highly positive life events causing profound changes in personal outlook, Maslow, 1959). However, because no voluntary memory condition was included in this study, it is unclear whether these findings pertain to involuntary memories only or whether voluntary recall would show a similar advantage for trauma memories.

A recent diary study was designed to remedy some of these shortcomings (Rubin *et al.*, 2008b). In this study, undergraduates first answered a questionnaire measuring PTSD symptoms. Students who scored either high or low on this scale then participated in a diary study of involuntary and voluntary memories. The recording of the memories was done on electronic data assistants (so-called palm

pilots) that the students were carrying at all times. Each time the participants recorded an involuntary memory, they were to record a voluntary memory from the same period of their life. The participants rated both types of memories on a number of scales measuring characteristics of autobiographical memories. According to the special mechanisms view (see Figure 7.1) we should expect an interaction between low versus high PTSD symptom levels and involuntary versus voluntary memory characteristics. For example, according to this view, the high-PTSD symptom group should have more sensory imagery associated with involuntary memories and less with voluntary memories than the low-PTSD symptom group. According to the basic mechanisms view (bottom panel of Figure 7.1), on the other hand, we should expect no such interaction. That is, according to this view, involuntary versus voluntary memory would follow the same pattern for low- versus high-PTSD symptom levels. Thus if the high-PTSD symptom group had more sensory imagery in relation to their involuntary memories than the low-PTSD symptom group, a similar difference between the two groups would be seen for the voluntary memories. This was exactly what we found. On none of the memory measures was an interaction seen between the involuntary versus voluntary condition and the high- versus low-PTSD symptom groups. Consistent with previous studies (see Chapter 6), the involuntary memories had more mood impact and more physical reaction than the voluntary memories, and they were seen as less central to the life story than their voluntary counterparts. These differences were equally pronounced for the high- versus low-PTSD symptom groups. The high-PTSD symptom group reported fewer positive memories and more mood impact and physical reaction than the low-PTSD symptom group, and their memories were more central to the life story. This pattern was equally pronounced for the involuntary and voluntary memories. In short, high versus low levels of PTSD did not have differential effects on involuntary versus voluntary memory qualities, which contradicts the special mechanisms view but is consistent with the basic mechanisms view.

Laboratory studies

One disadvantage of the naturalistic studies reviewed so far is that the original properties of the remembered events cannot be controlled during the time of encoding. One way of overcoming this problem is to examine involuntary memories for aversive pictorial stimuli encoded in a laboratory setting. Horowitz (1969a) was probably the first to study intrusive involuntary memories in healthy adults through experimental manipulation. In a typical experiment, Horowitz's participants saw either an emotionally upsetting film (involving bodily injury threat) or a neutral film. Afterwards, the participants took part in a trivial signal detection task, which demanded continuous attention. This task was frequently interrupted and the participants were asked to write a report of their mental content during the preceding period. Participants who had seen a stressful film reported significantly more intrusive thoughts than subjects who had been watching a neutral film (see Horowitz, 1975, 1986, for summaries of these experiments). Similar findings were more recently reported by Davies and Clark (1998) for involuntary memories of emotionally negative films recorded in a diary study. Witnessing an unpleasant film can be regarded as a relatively mild stressor as compared to real-life traumas. Since such mild stressors were also followed by involuntary memories, this may be seen to suggest that involuntary memories generally favor stressful experiences. This is exactly what Horowitz (1975) concluded in a summary of his stressful film experiments: "Intrusive and repetitive thought appears to be a general stress-response seen in a large proportion of persons after even mild to moderately stressful events. It is concluded that the intrusive repetitions observed clinically are extreme forms of this general stress-response tendency" (p. 1457). Horowitz and Becker (1973) found similar effects in an experiment involving positive stressful material (erotic films). This is interesting because it suggests that the enhancement of involuntary memory as a function of emotional arousal is not limited to negative emotion, but concerns different kinds of emotionally arousing events. Unfortunately, the

possibility that intense positive stimuli may produce similar effects has not been pursued further in this paradigm.

At any rate, because the stressful film experiments as conducted by Horowitz and colleagues lacked a voluntary memory condition, the experiments do not rule out the possibility that emotional stress during encoding would have had similar enhancing effects on voluntary recall, in which case involuntary memories would be no more a stress response than voluntary memory. In other words, had a voluntary condition been included in Horowitz's experiments, participants who watched the stressful films might also have had more persistent and vivid *voluntary* memories as compared to participants in the neutral condition. This agrees with recent findings showing that negative emotional stress during encoding was positively related to both voluntary and involuntary recall (Hall and Berntsen, 2008), consistent with the basic mechanisms view in Figure 7.1.

A number of studies using the stressful film paradigm have examined the view, inherent to the special mechanisms view, that reduced cognitive processing during encoding leads to an increased occurrence of intrusive memories (e.g., Brewin and Saunders, 2001; Halligan *et al.*, 2002; Holmes *et al.*, 2004). As mentioned, the idea that reduced attention during encoding would lead to enhanced explicit memory (in terms of frequent involuntary memories) conflicts with empirical evidence on the relation between attention and memory as derived from laboratory studies. Divided attention is consistently found to reduce subsequent performance on explicit memory tests (e.g., Craik *et al.*, 1996; Mulligan, 1998). However, the claim makes sense in terms of the theory of the VAM and SAM system described earlier (Brewin *et al.*, 1996b). In this theory, aspects of emotional scenes that get little conscious attention during encoding form the material of the SAM system from which involuntary conscious memories derive. Thus, following this view, one would assume divided attention during the encoding of a stressful film to lead to enhanced involuntary memories. However, contrary

to their own predictions but perfectly consistent with research on memory in general (e.g., Craik *et al.*, 1996; Mulligan, 1998), Brewin and Saunders (2001) found that conducting a tapping task during encoding was followed by a reduced frequency of involuntary film recollections in a subsequent diary study. In response to these findings, Brewin and colleagues (Holmes *et al.*, 2004) explicitly reversed the predictions derived from Brewin, Dalgleish and Joseph's (1996b) dual representation theory. Instead of predicting an overall effect of divided attention at encoding, they assumed this effect to be modality specific. According to Holmes *et al.* (2004), a competing visuospatial task would lead to reduced encoding into the SAM system and would therefore reduce (instead of enhance) subsequent intrusions, whereas a competing verbal task is expected to increase encoding into the SAM system and thus lead to more intrusions. The claim that conducting a parallel visuospatial task is followed by a reduction in the frequency of involuntary memories has been supported in a number of studies (e.g., Holmes *et al.*, 2004; Stuart, Holmes, and Brewin, 2006) and is perfectly consistent with the way divided attention during encoding has been found to affect explicit memory in general (e.g., Craik *et al.*, 1996; Mulligan, 1998). Considered by itself, it therefore does not support the need for special mechanisms. The more surprising claim that conducting a parallel, unrelated verbal task will increase subsequent involuntary conscious memories has been supported in only one published study (Holmes *et al.*, 2004, study 3; see also Holmes and Bourne, 2008, for a recent review). Because of difficulties with consistently replicating this finding, Holmes and Bourne (2008) suggest that the modulation of subsequent involuntary memories using dual tasks under encoding "may be more strongly associated with general attentional load than task modality *per se*." If so, the data from the experiments can be accounted for with no reference to special mechanisms in terms of hypothesized SAM and VAM systems with different functions.

A few studies have attempted to induce dissociative states while watching stressful films. However, it is unclear the extent to

which these studies have successfully manipulated levels of dissociation, and findings on subsequent intrusive memories are mixed (Holmes and Bourne, 2008).

Summary

The evidence for the purported dissociation between voluntary and involuntary recall of traumatic memories is not persuasive. Much evidence stems from clinical interviews, involving retrospective assessments. While this can be fine as a starting-point, more rigorous research is needed. It also seems problematic to examine incidences of involuntary memory retrospectively through voluntary recall and interpret the findings in support of theories that assume a marked discrepancy between the two types of recall. In addition, many of the studies have asked only about emotionally negative intrusive memories, and therefore have not examined the frequency of involuntary memories with a different emotional content. Importantly, this research generally suffers from the lack of a comparable voluntary memory condition. On top of these limitations, conflicting findings are reported. In short, the available evidence for the special mechanisms view is poor. In the next section, I will elaborate on the alternative basic mechanisms view.

EMPIRICAL EVIDENCE FOR THE BASIC MECHANISMS VIEW

In contrast to the special mechanisms view, the basic mechanisms view does not assume a discrepancy between involuntary and voluntary access to the traumatic event. In this view, traumatic events are generally highly accessible through both involuntary and voluntary recall (see Figure 7.1). Even though the current version of the DSM diagnosis for PTSD includes a symptom (C3) dealing with an “inability to recall an important aspect of the trauma” (American Psychiatric Association, 2000, p. 468), this symptom is very weakly related to the other symptoms in the diagnosis. A recent review of studies reporting factor analyses of the seventeen symptoms that

make up the PTSD diagnosis clearly shows that an “inability to recall an important aspect of the trauma” correlates very poorly with the other symptoms of the diagnosis (Rubin *et al.*, 2008a). Furthermore, there is no evidence that involuntary conscious memories often coexist with a lack of voluntary memory for the same traumatic event within the same person. In cases where the person is unable to voluntarily recall the trauma – for example in cases involving organic amnesia for the injury event – the person usually does not report involuntary conscious memories for this event, unless he or she has developed pseudo-memories on the basis of other people’s accounts (e.g., Klein, Caspi, and Gil, 2003; Rubin *et al.*, 2008a, for a review). In short, the alleged discrepancy between poor voluntary access and easy involuntary conscious access to the same traumatic memory appears unfounded.

The basic mechanisms view therefore takes a different starting-point. It assumes that the mechanisms that characterize involuntary memories in everyday life (including the way they differ from voluntary memories) can be extrapolated to account for characteristics of involuntary memories of traumatic experiences. In the following, I will discuss their *recurrent nature*, their *flashback quality*, and their *long-term persistency* along these lines. I focus on these characteristics among other things because they have often been seen as arguments for invoking special mechanisms (e.g., Ehlers and Clark, 2000) and because they are central characteristics of reliving symptoms in the current DSM diagnosis of PTSD (American Psychiatric Association, 2000).

The recurrent nature of involuntary trauma memories

Recurrent involuntary memories are memories that are subjectively felt as repeating themselves in consciousness. Whether it is actually the case that each recurrent memory is an exact copy of a previous recollection is an open question that I will discuss in this section. Outside of clinical settings, very little research has been done on recurrent involuntary memories (see Berntsen and Rubin, 2008).

The DSM-IV definition of PTSD lists a number of re-experiencing symptoms, including “recurrent and intrusive distressing recollections” of the trauma (American Psychiatric Association, 2000, p. 468). Such recurrent memories are seen as distinctive for traumatic events in many contemporary PTSD theories and as calling for explanations based on special mechanisms. As Ehlers *et al.* (2004) summarize this view: “People do not usually have persistent intrusive memories of meetings. The crucial question remains why people with PTSD have persistent re-experiencing symptoms, and what aspects of trauma memories explain them” (p. 408).

However, according to the basic mechanisms view, the recurrent nature of some traumatic memories does not require trauma-specific explanations. The recurrent nature may instead be explained as a consequence of their extraordinary accessibility in autobiographical memory (see Berntsen and Rubin, 2008, for more details of this claim). Memory for a traumatic event will typically be highly accessible for both involuntary and voluntary recall thanks to a variety of interacting factors. First, the high level of emotion experienced at the time of the event improves the consolidation of the memory (McGaugh, 2003, 2004). Second, the fact that the traumatic event is most likely to be schema-deviant, and thus distinctive, enhances its accessibility (Hunt and Worthen, 2006). Third, in the period after the trauma, the memory of this event will also be highly accessible as a result of its recency (Rubin and Wenzel, 1996). Fourth, events that are highly accessible as a result of emotion, distinctiveness, and recency will be frequently rehearsed either in thoughts, conversations, or both, which further increases the accessibility of the traumatic memory. Fifth, because of the unpleasant emotion associated with the traumatic memory as well as the need to concentrate on other matters in daily life, many people are likely to try to suppress thoughts about the traumatic event. However, thought suppression has been shown to have the paradoxical effect of enhancing rather than reducing accessibility (Wenzlaff and Wegner, 2000). Sixth, traumatic events often change people’s lives in

fundamental ways. In effect, in the period after the event, many current concerns of the person will be related to the trauma. Such trauma-related current concerns further enhance the accessibility of the traumatic event in memory (Klinger, 1975).

Thus a number of encoding and maintenance factors work in favor of the traumatic event. The accessibility of this event is therefore likely to be enhanced relative to memories of other autobiographical events. This enhancement is greatest in the period immediately following the event (because of recency), but need not be limited to the immediate post-trauma period, which I will say more about later. Following the rationale outlined in Chapters 5 and 6 and summarized in Table 6.2, this increased accessibility implies that common features of the environment that happened to be present in the traumatic event will be able to activate the traumatic memory, simply because this particular memory often will be the most accessible memory in the cue-related sample. For example, the memory of an assault may be activated by the location where it took place, the clothes one was wearing, by being alone, by darkness, by looking at another person's hands, etc., although these cues under other conditions would be too indistinct to activate a particular memory. Because factors related to encoding and maintenance have enhanced the accessibility of the traumatic memory relative to memories of other autobiographical events, even such a redundant cue as walking home alone may easily discriminate the traumatic event from alternatives and thus activate the memory. Cue-item discriminability, in this case, gets a lot of help from the increased accessibility of the memory. Thus, categories 3, 4, and 5 in Table 6.2 are especially relevant to our understanding of recurrent involuntary memories of traumatic events.

To illustrate, a young female participant in a diary study (Berntsen, 2001) reported three involuntary memories of a traumatic event in which she had been physically assaulted by her former boyfriend. This event had taken place some three or four months prior to the study. One memory of the assault came to her mind

when she was sunbathing in a solarium. She involuntarily remembered: "what it felt like in my face, how I tried to hide my face. How I had tried to get away." She did not indicate any cues for this memory in terms of overlapping features with the current situation; although the sensation of the heat on her face and skin may be regarded as a vague similarity. Another memory came to her mind at a crowded birthday party with lots of noise and smoke around her. In this context she involuntarily remembered: "what he looked like on that day when he came home, how he smelled of beer and smoke." A third memory occurred when she visited her neighbor (and friend), where she had sought help on the night of the assault. While at her neighbor's place, watching her own house through the window, she remembered: "I was afraid and ran to my neighbor. I was afraid he would follow me. I was tense and looked out of the window to see if he was coming" (Berntsen and Rubin, 2008).

As illustrated by these examples, different aspects of the same traumatic event may come to mind in response to different, but common, environmental features. Such cues, which under other circumstances could have activated a variety of events, now tend to repeatedly discriminate the traumatic event because of its increased accessibility relative to other memories. Subjectively, it may seem as if these different temporal and narrative aspects of the traumatic memory take turns in presenting themselves in consciousness in response to random features of the environment or thought. Thus, according to the present view, recurrent trauma memories will typically not reinstate identical content, but will be recurrent in the sense of elaborating the same autobiographical event from different temporal and narrative perspectives, triggered by a variety of situational cues. Because these situational cues vary in content and quality, different aspects of the event will be brought to mind.

We recently examined this issue by analyzing data collected in a previous diary study involving nine participants with a PTSD symptom profile. The analyses (see Berntsen and Rubin, 2008, for details) focused on memory records for which the participants had

indicated in the diary questionnaire that the recorded memory referred to the traumatic event that the participants had endorsed, when filling in a PTSD questionnaire a few weeks earlier. Thus the records were classified by the participants as recurrent trauma memories.

We found that the great majority of the recurrent trauma memories represented different time slices and/or different details of the event. Thus they were not duplicates of one another, but dealt with different parts of the same trauma narrative. They were also all triggered by different cues. The three memories of the assault victim quoted earlier provide a good illustration of this overall pattern.

Only one person's memory records were an exception to this pattern. This female participant had recorded three recurrent memories that all described a situation in which she was assaulted by a stranger (eight years earlier) when jogging by herself. All three records involved a description of the moment when she heard noises behind her, turned around, saw a man on the trail, and realized that he was running faster than her, for which reason she stepped aside to let him pass. The memory records ended with a description of the moment when the perpetrator (instead of passing her on the trail) attacked her from behind and got a stranglehold around her neck. But it was not just this person's memory records that were highly similar. Their retrieval contexts also had many identical features in that all three memories came to mind when she was jogging by herself on an isolated nature trail, feeling a bit tense, and suddenly saw or heard another person on the trail. Thus the cues for the recurrent memories were highly similar to one another and also overlapped to a high degree with the content of the recurrent memories. One possibility is that these highly similar cues constrained the reconstruction of the memories to be highly similar as well.

The finding that most recurrent trauma memories are not exact copies of previous ones but represent different temporal or narrative aspects of the same traumatic event agrees with Spence (1988), who suggests that even though recurrent memories may be experienced

and retrospectively characterized as repetitious, they may in fact be part of a continuously changing series of recollections. However, this position disagrees with the way recurrent trauma memories are often described in the PTSD literature based on other clinical observations (Brewin and Holmes, 2003; Ehlers and Clark, 2000). To disentangle these two different possibilities, we need more diary studies with online recording of involuntary memories that are subjectively felt to be recurrent. Such studies should compare different instances of what is considered as the “same” recurrent trauma memory within each person and assess the amount and type of overlap between them.

Accessibility is likely to vary between different temporal parts of the same traumatic event just as it varies among different events. Thus some parts of a traumatic event should be more easily accessed in memory than others. Following the basic mechanisms view, the most accessible parts would be the parts that are most likely to form recurrent memories. Thus within the remembered event itself, the part that is most emotional and distinctive should be most likely to be remembered repeatedly (although this does not imply that each instance is a verbatim copy of a previous one). This is consistent with the notion of tunnel memory, which refers to an enhanced accessibility of the most emotion-related aspects of a negative event at the cost of peripheral information (e.g., Berntsen, 2002; Christianson, 1992; Safer *et al.*, 1998), as well as with some clinical observations on recurrent intrusive memories (Horowitz and Reidbord, 1992). However, it conflicts with a theory introduced by Ehlers *et al.* (2002; see Ehlers *et al.*, 2004, for a review), according to which recurrent memories serve as warning signals for potential dangers. According to the warning signal hypothesis, moments *preceding* the trauma or *preceding* the worst emotional moments of the trauma (but not the worst moment itself) would be most likely to form recurrent memories.

In a questionnaire study involving 118 Danes who were tourists in Thailand or Sri Lanka at the time of the tsunami catastrophe on December 26, 2004, we examined which parts of the traumatic event were subjectively felt as more frequently recurring (see

Berntsen and Rubin, 2008). Among other things, the participants were asked how close they had been to the tsunami – i.e., whether they (1) had felt directly threatened by the wave, (2) seen the wave without feeling directly threatened, or (3) merely heard about the wave. They were also asked if they had recurrent memories of this event, and, if so, they were asked to describe the memory that they felt was most frequently recurring.

The relatively uniform temporal structure of the tsunami event (as this event was experienced by the tourists) allowed a classification of the written memory reports into narrative categories. We could then examine the frequencies of these narrative categories in the memory reports as a function of how close each participant had been to the tsunami. As shown in Table 7.1, the distribution of the narrative categories differed systematically between the three groups of participants who had reported different levels of distance to the tsunami. These distributions suggest that people were most likely to have recurrent memories for whatever had been their emotionally most intense moments. As Table 7.1 shows, those who reported that they had been directly threatened by the tsunami most often reported a recurrent memory about *Escaping*, followed by *Searching for loved ones*, which are likely to have been the most emotional moments within that group. A different distribution is seen among those who reported that they saw the wave without being directly threatened by it. Compared to the directly threatened group, the number of memories about *Escaping* dropped by a third, whereas four times more participants reported a recurrent memory of the moment when the wave hit the waterfront, which is likely to have been the most arousing moment for this group if they did not have to escape. Among those who heard about the tsunami from a safe distance, the most frequent narrative category was *Worst-case scenario*. This category, which was absent in the other two groups, dealt with fictitious situations of danger that were prevented by some accidental decision to go somewhere else on the day of the tsunami. For example, one participant who had not been near the wave envisioned

Table 7.1. *Frequency of narrative categories as a function of whether the participants were directly threatened by the wave, saw the wave, or heard about the wave from a safe distance*

Narrative category	Threatened N = 23	Saw N = 11	Heard N = 8
Beach before the wave	4.2	0.0	0.0
When the wave comes	8.7	36.4	0.0
Escaping	65.2	45.5	0.0
Searching for loved ones	17.4	0.0	25.0
Emotions	4.4	0.0	12.5
Destruction left by wave	0.0	18.2	12.5
Worst-case scenario	0.0	0.0	37.5
Going home	0.0	0.0	12.5

running away from the wave together with her husband and child, and the child would fall. In short, the recurring memories appeared to focus on those parts of the event that were associated with most emotional intensity for the participant in question.

The findings in Table 7.1 agree with the basic mechanisms view and the notion of tunnel memories, which both predict that the most emotionally intense moments would be most accessible. The findings do not agree with the warning signal hypothesis (Ehlers *et al.*, 2002), according to which the most recurrent aspects would be stimuli that were present shortly before the traumatic event or shortly before its worst moment (Hackman *et al.*, 2004, p. 233). Following this view, the categories *Beach before the wave* and *When the wave comes* should have been especially frequent among those who felt directly threatened by the wave, because in those cases these two narrative segments would most likely precede the worst moments (trying to escape). For those who reported seeing the wave without being directly threatened by it, the category *Beach before the wave* should be especially pronounced for the same reason. The frequencies

in Table 7.1 show that this is not the case. Only one person in the entire sample reports a recurrent memory of the beach before the tsunami came. These findings do not rule out the possibility that a minority of recurrent memories may indeed function as warning signals in the way described by Ehlers and her colleagues. However, this explanation does not apply to the majority of the reported memories in our study of memories for the tsunami (Berntsen and Rubin, 2008).

None of the findings presented so far clearly distinguishes the basic mechanisms view of recurrent trauma memories from the dominant view that such memories are limited to traumatic and/or stressful events and therefore require trauma-specific explanations. One way to argue against the idea of trauma-specific mechanisms would be to show that recurrent memories are also found for non-traumatic experiences and that they show the same pattern as everyday involuntary (and voluntary) memories with regard to emotional content. Thus recurrent memories should be found in a general population, in which they should be more frequent for positive than negative events and more frequent for events rated as high rather than low on a scale for emotional intensity. To examine this, a large sample of the Danish population (1,504 people between eighteen and ninety-six years) was asked the following question through a telephone interview conducted by Gallup (see Berntsen and Rubin, 2008, for details): "Do you experience that the same memories recurrently pop into your mind by themselves – so that they repeat themselves in consciousness? We are not asking about dreams but about memories that you experience when you are awake."

Roughly half of the participants confirmed that they had experienced such recurrent memories within the most recent year. Those who did were then asked to think of their most frequent recurrent memory and to assess (on five-point rating scales) whether the content was emotionally negative or positive, and whether it was emotionally intense. They were also asked about their age in their most recurrent memory.

The majority of the recurrent memories (58 percent) were rated as positive or as highly positive. Only a fifth of the memories were rated as negative or highly negative. Neutral memories accounted for a little more than 20 percent. In a similar analysis of intensity ratings, there was a reliable dominance of intense or highly intense memories as compared to memories rated as “little intense” or as not at all intense (when memories rated as somewhat intense were left out of the analysis). Thus, consistent with expectations derived from the basic mechanisms view in Figure 7.1, recurrent involuntary memories in everyday life are not limited to traumatic or emotionally negative material. As is the case for other involuntary autobiographical memories, they generally show a dominance of emotionally positive memories (see Chapter 4). Further, for older participants, a bump in young adulthood was found for positive, but not for negative, recurrent memories, consistent with what has been found for voluntary and involuntary memories in general, when examined in survey studies (Berntsen and Rubin, 2002; see also Chapter 4).

In summary, involuntary autobiographical memories that are subjectively felt as recurrent follow the same pattern regarding emotional content as (non-recurrent) involuntary and voluntary memories in daily life. They are rarely (if ever) duplicates of one another, but typically represent different temporal and narrative perspectives on the same event or course of events. Within the traumatic event, moments associated with highest levels of emotional arousal seem to show the greatest likelihood of forming memories that are subjectively experienced as recurrent. Although more research is needed to assess the extent to which the content of recurrent memories is variable or constant within a person, it seems that the mechanisms and characteristics of everyday involuntary memories can be extrapolated to account for recurrent involuntary memories after traumatic events. More systematic work in the future may indeed refute such explanation. However, since the present explanation is more parsimonious than explanations invoking trauma-specific mechanisms, it is a relevant starting-point.

Flashback quality of involuntary trauma memories

Another striking characteristic of involuntary trauma memories is their flashback quality, according to many accounts (e.g., Brewin and Holmes, 2003; van der Kolk and Fisler, 1995). In order to understand what flashback refers to, we have to dwell a little on the history of this notion (see Frankel, 1994, for a useful review). The term *flashback* originally refers to a narrative technique used in motion pictures and literature in which a chronological sequence of unfolding events is interrupted by the description of an event (or series of events) that takes place at an earlier point in time ("Flashback," in *Encyclopaedia Britannica*, 2007). However, this is not exactly the sense in which the term has been used in psychology. The flashback notion was introduced to psychology by Horowitz (1969b) in a description of intrusive images after the use of LSD. In Horowitz's original usage, flashback referred to unbidden and persistent images of hallucinations that had been experienced while the person was influenced by LSD. These images were often triggered by cues in the environment that matched parts of the original hallucinatory experience. For example, Juve (1972) observed a case in which a client "had entered a hamburger drive-in while on an LSD trip and observed the employees preparing milk shakes. From that time on, the sound of any kind of mixer set off a rainbow of swirling colors for the client" (pp. 47–8).

Because the images often occurred a long time after the immediate biochemical effect of the drug had ceased, they were seen as an involuntary memory phenomenon – although their correspondence to the original drug experience is debatable (Frankel, 1994). In Horowitz's (1969b) original definition, LSD flashbacks were described as "repeated intrusions of frightening images in spite of volitional efforts to avoid them" (p. 565). Despite the striking similarity between this description and later descriptions of intrusive trauma memories, Horowitz did not explicitly link LSD flashback and traumatic intrusive memories in his 1969 article on the former.

It is unclear exactly when the flashback notion entered the literature on posttraumatic stress reactions. However, the term

flashback was included in the PTSD diagnosis only in 1987 (Frankel, 1994). It is also unclear exactly how the notion of traumatic flashback differs from the notion of intrusive trauma memories, because both involve involuntary recollections of the traumatic event. Some accounts of flashback have suggested detailed and indeed veridical recall of the original event, but presented little evidence in support of this view (see Frankel, 1994, for a review). Definitions of traumatic flashback vary in the literature, but appear to agree on highly vivid imagery in combination with a clear emotional and/or behavioral reaction. For example, Kline and Rausch (1985) describe flashback as “memories so vivid that they are experienced as reliving the past in the present” (p. 383). According to Burstein (1985): “Posttraumatic flashbacks are revisualizations of a traumatic scene that occurs with realistic intensity” (p. 374). Pitman (1988) similarly defines flashback as “a full-blown, complete experiential memory of the traumatic event” (p. 184). In Hellowell and Brewin’s (2002) definition, flashback involves “intense and sometimes fragmentary reliving of the traumatic event” (p. 1144). In the current PTSD diagnosis, dissociative flashback is mentioned as a form of “acting or feeling as if the traumatic event was recurring” (American Psychiatric Association, 2000, p. 468). Thus it seems that flashbacks are considered as a subclass of intrusive trauma memories that involve a marked sense of reliving of the original traumatic experience. Nonetheless it is unclear exactly how much reliving is required for an ordinary intrusive memory to qualify for flashback.

Do we have any indication that everyday involuntary memories could be associated with such flashback-like intense reliving, or is this phenomenon limited to traumatic events? I believe the latter assumption is incorrect. In Chapter 6, I mentioned diary studies showing that involuntary memories more often than voluntary memories come with a marked emotional impact and identifiable physical reaction, which can be seen as an important aspect of flashback. For example, in Berntsen and Hall’s (2004) diary study of involuntary and voluntary autobiographical memories, 32 percent

of the involuntary memories were accompanied by a marked physical reaction against 23 percent of the voluntary memories. In addition, 48 percent of the involuntary memories had a noticeable impact on the person's mood, compared to 36 percent of the voluntary memories. Furthermore, several of the examples quoted from Marcel Proust in Chapter 6 involved highly intense reliving of the past. Indeed, he described the experience of these memories in a manner consistent with many definitions of flashback emphasizing strong reliving (see examples in Chapter 6).

As discussed in Chapter 6, one possible explanation why involuntary memories more frequently than voluntary memories are accompanied by an emotional reaction is that the former, because of their sudden and spontaneous nature, allow little room for antecedent emotion regulation (Gross, 2001). Another possible explanation is that an associative activation of prior emotional reactions (as known from studies of fear conditioning) is more common for involuntary than voluntary recall. At any rate, it seems possible that the flashback quality of involuntary trauma memories may be a quality associated with involuntary autobiographical memories in general that becomes more pronounced for involuntary memories of traumatic events, because of the markedly emotional content of such memories. If so, we should also find involuntary memories with flashback quality for non-traumatic events, such as highly positive experiences.

I examined this issue in a diary study of involuntary memories among participants with a PTSD symptom profile (Berntsen, 2001, study 2), described earlier. In this study the participants recorded fifty involuntary memories via the usual diary procedure (see Chapter 3) and answered a number of questions. Among other things, the participants were asked to rate the vividness of the memories and to indicate if the memory influenced their mood and was accompanied by a noticeable physical/overt reaction. Following the theoretical definitions of flashback described earlier, a memory record was classified as a flashback, if it (a) had received the maximum score on the

vividness scale, (b) had a perceptible impact on the subject's mood, and (c) was accompanied by a detectable physical reaction by the subject at retrieval. These three criteria were used to operationalize the extraordinary "reliving" quality of flashbacks that clinical accounts of flashback seem to center on. A third of the recorded trauma memories and roughly 10 percent of the non-trauma memories satisfied the flashback criteria. Thus even though flashbacks were considerably more common for traumatic than for non-traumatic events, they were far from limited to the former, nor were they limited to emotionally negative events. Roughly half of the non-traumatic flashbacks referred to emotionally positive events. Further analyses revealed that ratings of emotional valence were unrelated to flashback quality. Regarding qualities of the remembered event (rated retrospectively), the only significant predictors for flashback were intensity of the original emotion and distinctiveness of the event (Berntsen, 2001), consistent with the basic mechanisms view (Figure 7.1). In order to illustrate flashbacks with a non-traumatic content, consider the following examples (from different diary studies). The first example is clearly negative, but would not qualify as a traumatic experience according to the trauma definition for the PTSD diagnosis, because the person's life is not in danger nor is she injured (or witnessing other people in danger of their life or injured) and because sadness (rather than fear) seems to be the dominant emotion (American Psychiatric Association, 2000). The second example is positive and the third a mixture of both positive and negative emotions, according to the participants' ratings.

Example 1: female, twenty-seven years

The participant is in a bed in her parents' home. She feels relaxed and content until the memory suddenly comes. The memory is related to an unpleasant political disagreement with her father in relation to an election for the European Parliament:

"We had just had our dinner. I was on my way up to my room to continue reading. I met my dad in the corridor, and he

pointed at a photograph in the newspaper and said: 'Look, that is your friend.' At first I thought that it might be a photograph of an old school friend, but then I realized that it was a picture of an extremely right-wing politician. My dad said that everyone who was against the union would be seen as siding with the far right. I tried to defend my opinions but I was so puzzled and sad that he would talk in such a way to his own daughter."

The memory was rated at maximum on the scale for vividness; it had a negative mood impact and was accompanied by the following reaction: "Made me cry intensely for a very long time, thinking about similar episodes in the past."

Example 2: male, twenty-six years

The participant is talking to his girlfriend about the coming summer vacation. The following memory pops up:

"I remember myself in the water on a surfboard in Australia right in that moment when the wave catches the board."

The memory was rated at maximum on the scale for vividness; it had a positive mood impact and was accompanied by the following reaction: "My chest raised and I got butterflies in my stomach."

Example 3: female, twenty-two years

The participant is attending a seminar on social psychology. A theoretical problem is being discussed and metaphorically illustrated by a person approaching an abyss. The following memory comes to the participant's mind in response to the abyss metaphor:

"I remember once in Norway, where I fell over the side of a mountain. I took a wrong step on a very narrow path and a moment later I was hanging clinging to the side of the mountain. It was a very funny situation, although it was dangerous, and we were laughing wildly when I was out of danger."

The memory was rated at maximum on the scale for vividness; it had a positive mood impact and was accompanied by the following reaction: "I cracked up and laughed."

In short, highly vivid involuntary memories with a marked emotional impact and an overt reaction are not limited to traumatic events. It seems to be a quality that can be associated with involuntary memories of many different kinds of events, and especially events that were emotionally intense at the time when they took place. Once again, it seems that characteristics of involuntary autobiographical memories in everyday life may be extrapolated to account for characteristics associated with involuntary memories of trauma.

Long-term persistency

I opened this chapter with a description of a powerful intrusive memory from World War II experienced by an older woman. This woman's description of reliving the past in the present would qualify as a flashback according to most definitions. In addition, her case may be viewed as an instance of category 2 in Table 6.2 in the sense that a rare and unexpected combination of features of the personal environment activates a memory in which a similar unique combination of features plays a central role. The rare combination of features is the low-flying, attacking, and crashing airplanes leading to the unbelievable collapse of a big apartment/office building. She witnessed this highly remarkable scene twice in her life: as a young woman in 1945 and again on TV on September 11, 2001. The second time brought back the memory of the first time and a strong emotional reaction.

According to the special mechanisms view, the occurrence of such powerful intrusive memories several decades after the event would reflect the fact that the experiences that these memories are about never became sufficiently integrated into the person's overall autobiographical knowledge (see the top panel of Figure 7.1). For that

reason, the memories are hard to access through strategic recall, whereas they repeatedly come to mind involuntarily in response to trauma-relevant cues in the environment or thought. However, in the case of the seventy-seven-year-old woman, it seems that the traumatic event from her youth has not been repressed or unavailable in the intervening years. On the contrary, according to her own explanation, the memory of the traumatic event has played a very central role for her personal identity and her ways of thinking throughout her life. As she explained: "This event made me strongly against war, weapons manufacture, and any form of violence. I almost forced my sons to refuse military service."

This agrees with the basic mechanisms view, according to which persistent intrusive memories many years after the event would reflect the fact that the traumatic memory has stayed accessible for both voluntary and involuntary recall in combination with the presence of cues that are sufficiently distinctive to activate the memory. How would such a high level of accessibility be maintained for several years, sometimes decades, when normal forgetting would predict otherwise (e.g., Rubin and Wenzel, 1996)? One possible explanation is that the traumatic memory becomes a reference-point for the interpretation and structuring of other events, as illustrated by the seventy-seven-year-old woman's statements about how the bombardments influenced her general attitude towards war and militarism. On this interpretation, memories of traumatic events may take on the same generic role as many memories of non-traumatic, important autobiographical events are known to fulfill. Such memories are likely to be salient in the autobiographical knowledge-base, and form units of knowledge that influence the attribution of meaning to other events. For example, they structure our life narratives by providing turning-points and forming beginnings and endings of periods of life (e.g., Conway and Pleydell-Pearce, 2000; McAdams, 2001; Robinson, 1992), and they are observed to anchor and stabilize our conceptions of ourselves (Pillemer, 1998). While these mechanisms are functional for non-traumatic life events, such

as graduation, weddings or the birth of a child, they are likely to have maladaptive consequences in the case where a trauma serves the same role. As a consequence, the traumatic memory will remain highly accessible in the autobiographical knowledge-base and it may often be called upon (often associatively through involuntary recall) in the interpretation of other events (e.g., Tversky and Kahneman, 1973).

Recently, we (Berntsen and Rubin, 2006b, 2007) introduced the Centrality of Event Scale (CES) measuring the extent to which a traumatic event is perceived as central to the person's life story and identity. The CES contains such statements as "I feel that this event has become part of my identity"; "This event has become a reference point for the way I understand myself and the world"; "I feel that this event has become a central part of my life story"; "I often think about the effects this event will have on my future." We have demonstrated in several studies that the CES (or subsets of items from the CES) correlates positively with the level of PTSD symptoms as measured by standardized scales (Berntsen and Rubin, 2006a, 2006b, 2007, 2008; Berntsen and Thomsen, 2005). For example, in the study with tsunami survivors described earlier, we found a correlation of .65 between the CES and a scale measuring PTSD (Berntsen and Rubin, 2008).

These findings conflict with the special mechanisms view that the trauma memory is frequently activated involuntarily because it is poorly integrated into the person's autobiographical knowledge. Instead the findings support the opposite view. Consistent with the basic mechanisms view, the more accessible and central the traumatic memory is to the organization of the person's life story and identity, the more likely it is to generate intrusive memories, flashbacks, and other PTSD symptoms.

Summary

In this chapter I have argued that the special mechanisms view of involuntary trauma memories has little empirical support. As an

alternative, I argued that involuntary traumatic memories may be governed by the same mechanisms that govern involuntary memories in daily life. These ordinary mechanisms may have severe dysfunctional effects when applied to extremely negative situations. Following this line of thinking, I have shown how characteristics of everyday involuntary memory may be extrapolated to account for involuntary memories of traumatic events, notably their recurrent and persistent nature and their tendency to form flashbacks. Although beyond the scope of the present chapter, it is highly likely that such dysfunctional effects are mediated by personality and other predisposing factors related to the individual (Rubin *et al.*, 2008a). Clearly, more studies on involuntary memory in clinical samples are needed before we can decide to what extent these suggestions are valid. Nonetheless, trying to extrapolate findings from everyday memory to account for dysfunctional effects in relation to traumas seems to be a useful strategy, suggesting new and promising avenues of research.

8 Future and past

Organisms that live entirely in the present, uninfluenced by the past and unprepared for the future, are low on the evolutionary scale.

(Miller, 1962, p. 299)

Being able to envision possible events in our personal future may be as important for our survival as the ability to remember our personal past. At the same time, memories of past experiences may greatly constrain what we are able to imagine for the future. As pointed out by Miller (1962), in the infancy of cognitive psychology: “It is essential to leave one’s ideas open to the great variety of possible motivations, to the endless subtle ways that people can project their past into a vision of the future” (p. 303). Later Tulving (1985) reformulated his notion of episodic memory to include the ability to mentally project oneself into possible future events. He described the case of an amnesic patient who in addition to being unable to recollect past events was unable to imagine events in the future. More recent findings from both brain imaging and behavioral studies support the view that recalling the past and imagining the future are highly interrelated mental processes (e.g., d’Argembeau and van der Linden, 2004; Okuda *et al.*, 2001).

Do images of possible future events also come to mind involuntarily? Do we have an unbidden future in addition to our unbidden past? So it seems. In this chapter I will review evidence showing that spontaneously constructed future event representations – or spontaneous flash forwards – may be as common in daily life as involuntary autobiographical memories. This raises the question as to how an associative and uncontrolled process can form a mental representation of a future event that by definition has not taken place. Clearly this cannot be explained by simply referring to the spontaneous activation of previously formed memory “traces” or engrams. Yet I will argue in this chapter that involuntary future

event representations may be created in ways that are highly similar to the generation of involuntary autobiographical memories, namely, through spreading activation in associative networks in response to relevant cues in the environment or thought.

Later in this chapter I will discuss the implications the work reviewed in this book may have for our broader understanding of episodic (or autobiographical) memory. The findings reviewed here have shown that mental time traveling – a defining feature for episodic memory – can take place in two different ways. One is a strategic and goal-directed mode supported by highly developed neurocognitive mechanisms that may be specific to humans, as argued by Endel Tulving and his colleagues (e.g., Tulving, 2002). The other is an involuntary and uncontrolled mode governed by less advanced neurocognitive mechanisms that are probably evolutionarily older and may also exist in non-human species.

THE UNBIDDEN FUTURE

The capability to project oneself into the future and imagine potential events is a central aspect of the notion of daydreaming, but this notion also includes thinking about the past and fantasizing about the lives of others, as pointed out in Chapters 1 and 2 (Singer, 1966). More recently, imagining events in the future has been integrated with the notion of episodic memory, and paralleled empirically and theoretically with our ability to recollect personal events in the past. Atance and O'Neill (2001) define *episodic future thinking* as: “a projection of the self into the future to pre-experience an event” (p. 533). Brain imaging studies of voluntary imagining of events in the personal past and future show a great deal of overlapping activity (Addis *et al.*, 2007; Okuda *et al.*, 2001; Szpunar *et al.*, 2007), although more brain areas are active during episodic future thinking than during recollections of past events, especially in the construction phase (Addis *et al.*, 2007). Behavioral studies on subjective qualities of the two forms of event representations show that both are predominantly visual (Larsen, 1998) and that emotional valence and

temporal distance influence the two types of personal event representations in similar ways (d'Argembeau and van der Linden, 2004), which is consistent with the assumption that they draw upon the same episodic memory system (Tulving, 1985). Some studies suggest that images of future events are less sensorily detailed and vivid than autobiographical memories (d'Argembeau and van der Linden, 2004; Larsen, 1998; but see Addis *et al.*, 2007). In addition, images of future events are generally more positive than remembered past events. People are apparently reluctant to imagine that bad things might happen to them in the future (Newby-Clark and Ross, 2003).

Previous studies on episodic future thinking have focused entirely on voluntary projections of the self into the future, with strategically monitored pre-living of the potential future event. Do people have *involuntary* future event representations in the same way as they have involuntary autobiographical memories? As already mentioned, in a very recent study we had participants in a diary study record both involuntary autobiographical memories and involuntary future event representations. Following a standard diary procedure (Berntsen and Hall, 2004), each time the participant had recorded an involuntary memory (or future event representation) they were to record a voluntary match elicited by a word cue. We were thus able to compare involuntary versus voluntary future event representations with involuntary versus voluntary autobiographical memories (Berntsen and Jacobsen, 2008). In most cases, our participants found that involuntary future event representations were just as common and as easy to record as the involuntary memories. Estimates of daily frequency typically ranged from five to ten, and generally did not differ from the estimated daily frequencies of the involuntary memories in the same study, although some participants had more of one type than the other. Consider a typical example of an involuntary future event representation (female, twenty-two years):

Current situation: I was driving on the highway. My mother, grandmother, and younger brother were in the car. We were on our

way home from a family celebration. I was thinking that I would like to get home fast and therefore I was wondering whether I should increase my speed.

The involuntary future event representation: I was driving too fast and in a few weeks I would receive a letter in the mail, which I would open in my mother's living-room. The letter would be a speeding ticket with my picture, because I had been caught by a speed camera, which I hadn't noticed.

As with involuntary memories, the majority (76 percent) of the involuntary future representations had cues in the current situation in terms of salient commonalities between the event representation that came to mind and the current situation of the person. External and internal cues were equally frequent for the involuntary future event representations, whereas a dominance of the external cues relative to internal cues was found for the involuntary memories, consistent with previous studies (see Chapter 5). Thus the involuntary future event representations were more often internally triggered than the involuntary memories. However, the cue categories endorsed for the two types of event were highly similar. Object, person, theme, and location were the most frequently mentioned cue categories for both types of event, maybe reflecting that these categories of information are salient and recurrent in daily life. Similarly, both the involuntary future representations and the involuntary memories most frequently came to mind when the person was not concentrated on a particular task. For both types, fewer than 20 percent came to mind when the participant was concentrated or highly concentrated. In short, the involuntary future event representations came to mind under conditions that were strikingly similar to the conditions under which involuntary autobiographical memories are activated.

With regard to their subjective characteristics, the involuntary memories and future event representations differed from their voluntary counterparts in highly similar ways. Irrespective of the future versus past orientation, the involuntary representations were more

specific, more vivid, had more negative (but not more positive) mood impact than their voluntary counterparts. They were rated as less emotionally positive, and people wrote longer (thus more detailed) descriptions of their involuntary than their voluntary memories and future event representations. There were many similarities and some differences between the future representations and the memories. As we predicted, these differences were largely uninfluenced by whether their retrieval was involuntary or voluntary. For example, the future event representations were more positive and less rehearsed than the autobiographical memories, irrespective of whether they were retrieved involuntarily or voluntarily. The future event representations also reached less into the future than the memories reached into the past. The great majority of the future events referred to experiences that were expected to happen within the current year of the participant's life.

The fact that the involuntary versus voluntary retrieval affected the future event representations and memories in highly similar ways is consistent with the idea that envisioning the future and remembering the past are supported by the same episodic memory system, as well as the view that this system can operate through both a voluntary and involuntary mode.

How do involuntary future event representations come to mind? In other words, how can a process that is not consciously monitored lead to the construction of a coherent and vivid representation of a novel personal event? We struggled with a similar question about involuntary memories in Chapter 5, but the question seems to be even harder to answer for involuntary future representations. An important difference between them and involuntary memories is that involuntary future representations by definition have not yet been experienced and therefore not encoded. Thus we cannot solve the puzzle of their spontaneous occurrence by simply referring to the activation of previously encoded traces or engrams, as some might do for memories. However, if we assume (as we indeed did in Chapter 5) that involuntary autobiographical memories owe

their occurrence to spreading activation in associative networks rather than to mechanical reactivations of fixed traces, then the generation of an involuntary future event representation may be explained as the spontaneous creation of a “false memory” in the same autobiographical memory network. I use the term “false memory” here in a slightly different sense than normally in the literature. By false memory in the present context, I do not mean a representation of an event that the person actually erroneously believes has taken place in the past. I mean an event representation with elements that the person identifies as not belonging to the past but nonetheless “relives” as if it were a representation of a real event. Thus the construction of the event is accompanied by autonoetic awareness (Tulving, 1985). Instead of being dated in the past, this “false memory” is classified by the subject as representing a potential future event. This judgment can take place on the basis of purely semantic personal knowledge, which is not considered to belong to the episodic memory system (Tulving, 2002). Expressed in the terms normally used in the episodic memory literature, it is a “know” not a “remember” judgment. For instance, in the example above, the person is likely to *know* that she has not received a speeding ticket in the past. Thus the event representation of receiving a ticket cannot be classified as a memory, but may be classified as a potential event in the future. Receiving the speeding ticket seems to be the only part of the event representation that may not be constructed from her personal memory (on the assumption that she has indeed not yet received a speeding ticket). Her mother’s house and living-room in which she opens the envelope in the imagined future event can all be generated from a network of autobiographical knowledge in the same way as an involuntary memory of a past event would be.

The speeding ticket example is quite typical for the involuntary future event representations that were recorded in our study. Most involuntary future event representations involved familiar autobiographical information (friends, families, daily routines, familiar locations, etc.) together with some novel components that

might have derived from the present context or from cultural stereotypes. Often the future event representation dealt with events that were already scheduled to take place in the near future (e.g., a trip or family event). For example, a twenty-four-year-old female participant spontaneously envisioned how she would have difficulty choosing her clothes for a family celebration scheduled to take place a few weeks later: "My cousin's Confirmation two weeks from now where we are supposed to be at the church at 9 a.m. and I have a clothes crisis and I am already in a panic the night before."

Another twenty-four-year-old female participant spontaneously imagined a scene from a trip that was planned to take place in the near future: "I imagine my girlfriends and me getting off the train at the railway station in Berlin. We are happy and do not bring very much luggage. There are an incredible number of people on the platform and we follow the crowd out through the arrival hall while the train leaves behind us."

Although the train station in Berlin may (or may not) be a novel setting for this participant, train stations in general would be very familiar to most Danes. And she almost certainly would know how her girlfriends would typically behave in such situations. Thus a lot of the information in the future event representation might be construed from her personal memory.

Some future event representations involved cultural transitional events (e.g., wedding, graduation, child birth) incorporated into a familiar autobiographical setting, as in the following example in which a twenty-seven-year-old female participant while attending a wedding envisions her own: "I imagine that I am the bride, dressed up in a big white dress and my boyfriend is waiting for me at the altar. All our guests are looking at me. The sun is shining outside."

In another dominant category of cases, the event representation appeared to be purely autobiographical, with no novel components. Thus, in such cases, nothing obvious appeared to have required dating the event in the future. The categorization of the event as belonging to the future and not the past might have been based on

subtle cues, not mentioned in the report, such as aspects of the context when the future event representation came to mind. Consider the following two examples:

A friend and I are having a beer together before we continue to a party, probably a party at the Psychology Department (male, twenty-five years).

I imagine myself bicycling to the supermarket. I look at the groceries in the refrigerated display counter. I take some cottage cheese from the shelf (female, twenty-three years).

As the examples illustrate, the content of involuntary future event representations range from finding cottage cheese in the supermarket to envisioning major turning-points in life. In this respect, involuntary future event representations resemble involuntary (as well as voluntary) autobiographical memories, in that the latter may also deal with both highly mundane experiences as well as significant landmark events. Previous work has shown that culturally shared life scripts to some extent structure what we recollect from our past (Berntsen and Rubin, 2004). Indeed, shared ideas of culturally expected transitional events also seem to affect the content of spontaneously generated future event representations, notably events expected to happen in the more distant future – e.g., a student spontaneously imagining her wedding supposedly taking place several years into the future (Berntsen and Jacobsen, *in press*).

Much more needs to be learned about involuntary future event representations. For now it is sufficient to conclude that we have them, and that they seem to behave much like involuntary autobiographical memories.

POSSIBLE IMPLICATIONS FOR OUR UNDERSTANDING OF EPISODIC MEMORY

The ability to mentally travel into the personal past and future is the key defining characteristic of episodic memory (Tulving, 2002; Wheeler *et al.*, 1997). In this book I have reviewed evidence showing

that mental time travel can take place in an involuntary, automatic mode in addition to a voluntary, strategic mode. What are the implications of these findings for our understanding of autobiographical memory? Although the data at the present point in time do not allow any firm conclusions, it seems reasonable to discuss, albeit speculatively, some possible implications.

Theories of episodic memory have so far focused on mental time travel in its voluntary and strategic form. Indeed, in Tulving's (1983) early formulations, episodic memory was associated with deliberate recall whereas semantic memory was argued to rely on automatic retrieval processes:

Access to, or actualization of, information in the episodic system tends to be deliberate and usually requires conscious effort, whereas in the semantic system it tends to be automatic. A perceptual change in the person's environment – appearance of a stimulus object, a change in the current situation, a verbal utterance or instruction, and so on – is immediately, and in the first instance, responded to and interpreted in terms of semantic knowledge. The same stimulus reminds a person of a particular episode only when the person's mind is in a particular state; the episodic system must be in the "retrieval mode" before a stimulus change in the environment can serve as an effective retrieval cue to stored episodic information (p. 46).

As Tulving (1983) points out himself, it is unclear exactly what is meant by the notion of "retrieval mode." Nonetheless, most studies on episodic memory have indeed focused on memories that are strategically recalled. Several studies have documented the importance of the frontal lobes for mental time travel when episodic memory is examined through strategic retrieval tasks (e.g., Wheeler *et al.*, 1997, for an overview). In line with such findings, scholars have argued that episodic memory is a late evolutionary development that is specific to humans (e.g., Tulving, 2002). However, involuntary mental time travel has not been considered in this context.

I suggest that the involuntary mode of episodic memory is an evolutionary forerunner of the more advanced voluntary mode. It is rendered possible through a reciprocal and extremely well-tuned relationship between the organism and its natural environment (Tinbergen, 1963). The organism has a biological (and with humans and possibly also other advanced species also a cultural) preference for attending to and memorizing certain features of the environment over others. Through such interaction, the environment helps to provide content, structure, and quality to mental life (see Chapters 5 and 6).

In the voluntary mode, the dependence on the immediate environment and its immediate cues is lessened – although the environment does have an effect, as shown in studies of context-dependent memory (Godden and Baddeley, 1975). The voluntary mode is substantially more advanced from a cognitive point of view in that the organism constructs its own memory cues (i.e., search descriptions) based on stored knowledge and pursues retrieval in an active and goal-directed manner.

If this view is correct, the main difference between involuntary and voluntary episodic memory would concern how the memories are retrieved, whereas factors related to encoding would be expected to show the same pattern for the two types of recall (e.g., emotional arousal would enhance access irrespective of whether recall is involuntary or voluntary). As argued in Chapters 4 and 6, this expectation is supported by several findings. Both types of memories show a marked recency effect and a standard forgetting curve, and both show childhood amnesia and a bump in young adulthood. The two types of memory also seem to show the same relation to emotion at the time of encoding. Emotional intensity enhances access for both types of recall. As is the case for voluntary memories, involuntary autobiographical memories are much more frequently about positive rather than negative events. The two types of memories also seem to show the same pattern in relation to rehearsal. Thinking and talking about a particular memory increase its accessibility for both

involuntary and voluntary recall, although some studies suggest that involuntary memories on average may be slightly less rehearsed than their voluntary counterparts. A recent brain-scanning study has shown that both involuntary and voluntary recall activate brain areas that have been associated with retrieval success (the medial temporal lobes, the precuneus, and the posterior cingulate gyrus), whereas voluntary compared to involuntary recall showed enhanced activity in areas of the right prefrontal cortex that are known to be involved in strategic retrieval (Hall *et al.*, 2008). These brain-imaging findings confirm that retrieval success (or ecphory) is not contingent upon strategic search, and they are consistent with the idea that involuntary episodic recall is an earlier evolutionary development than its voluntary counterpart.

The present view suggests several lines of future research. Notably, according to the present view, involuntary mental time travel may survive in people when structures supporting the voluntary mode break down. This agrees with preliminary observations on older people with severe dementia who are unable to retrieve memories when requested but who may spontaneously remember incidences from their past when stimulated by appropriate cues (Kryger *et al.*, 2005). We should also be able to observe involuntary mental time travel in brain patients with damage in the prefrontal cortex and an inability to retrieve memories in a strategic fashion. If an ability to recover memories for past events could be enhanced in such cases by stimulating the involuntary mode through a wealth of concrete relevant cues provided by family and friends, this could have important implications for the treatment of such patients. Unfortunately, very little research has addressed this issue.

In addition, the present view suggests that the involuntary mode would be an earlier ontogenetic development than the voluntary mode. Studies with infants show memory-enhancing effects of exposure to non-verbal reminders of an event (Rovee-Collier, 1999), but it is not clear whether this effect involves involuntary memories that are conscious to the child or whether it is an unconscious

reinstatement effect. We have only some preliminary data suggesting the occurrence of involuntary memories among preschool children (Morton, 1990). Thus more research needs to be done to examine the developmental trajectories of involuntary and voluntary episodic memory. Finally, according to the view delineated here, it seems likely that other species than humans may be able to experience involuntary mental time travel, although they may be incapable of the voluntary form of mental time travel. I discuss this issue in what follows.

Involuntary mental time travel in other species?

Research on animal learning testifies beyond any possible doubt that many other species than humans are able to learn via associations. Indeed, association via contiguity is the basic principle underlying operant and classical conditions. Spontaneous cuing (which seems to be largely association via contiguity), in combination with constraints posed by the relative salience of previously learned material, is the basic mechanism underlying the activation of involuntary memories and their future counterparts, as I have argued. Following this view, there seem to be no obvious reasons for assuming the absence of some form of involuntary mental time travel in other species.

This agrees with recent research on animal cognition. Very convincing documentation for sophisticated memory and planning skills in non-human species has been provided by Clayton and Dickinson and their colleagues. Clayton and Dickinson (1998) showed that scrub jays were able to remember where they stored food, what food was stored, and when they stored it. The scrub jays prefer wax worms to peanuts when the worms are fresh, but peanuts to worms when the latter have decayed. Knowing when a certain food item is cached is therefore crucial in order to get the preferable item to eat. In the experiment, the scrub jays cached worms and peanuts at two different locations and two different times. One group of birds first cached peanuts and five days later worms. The other groups first cached worms and five days later peanuts. Four hours after caching

the last food items, the birds were given the opportunity to recover the cached food (with the food being removed). The jays whose worms had been decaying for five days searched more for peanuts, whereas the other group, whose worms had been cached only four hours earlier, showed a preference for the worms. In two recent experiments, Raby *et al.* (2007) showed that scrub jays have an ability to plan for their future. Each bird lived in a large cage with three adjoining rooms. They were kept in the middle room at night. In the evening in the training phase they were given powdered pine nuts, which they can eat but not cache. In the mornings, they were placed in one of the two side rooms. In one of the two rooms they always got breakfast. In the other room they were never fed. In the test phase, the powdered pine nuts in the evening were replaced by whole pine nuts (which the birds can cache). Doors to the two morning compartments were open and the birds were given the opportunity to cache the whole nuts in these rooms. If the birds were able to plan for the future, they should be expected to cache more nuts in the non-breakfast room than in the breakfast room. This was exactly what was found. Three times as many pine nuts were cached in the room in which the birds were used to not being fed in the morning. In a follow-up study, the birds were always fed in the morning in the training phase. In one room they always had peanuts for breakfast; in the other room always dog kibble. When they were offered the opportunity to cache both types of food in the test phase, they cached more peanuts in the dog kibble breakfast room and more dog kibble in the peanut room, thus providing the room with the food type that it had lacked in the training phase. The two experiments together show a very flexible ability to plan for the future that cannot be accounted for in terms of instinct or immediate motivational states.

How should the sophisticated memory and planning behavior demonstrated by the scrub jays then be explained? One possibility is that the birds mentally projected themselves back and forth in time and envisioned themselves storing the food in the past and recovering the food in the future. In this interpretation, the birds would have

autonoetic awareness qualifying for episodic memory. As argued earlier, this could take place in an involuntary form – a possibility also suggested by Clayton and Dickinson and their colleagues (Clayton *et al.*, 2003). Alternatively, the memory and planning demonstrated by the scrub jays may involve only some form of semantic memory and thus take place with no autonoetic awareness, as argued by other researchers (Suddendorf, 2006; Suddendorf and Busby, 2003; Suddendorf and Corballis, 2007). Because mental time travel refers to a subjective state, this issue is impossible to resolve without verbal reports, which of course are not available in the case of scrub jays. From a Darwinian perspective the most parsimonious assumption seems to be that the ability to remember events in the past and foresee events in the future is governed by similar mechanisms in humans and other species. A good candidate for such mechanisms seems to be involuntary mental time travel.

Differences in subjective time span

Even if we would accept this argument and thus the assumption that scrub jays and other non-human species are capable of involuntary mental time traveling, this mental time traveling would most likely have a quality quite different from that experienced by humans. One especially crucial difference would be that the subjective time span along which jays and other non-human species may project themselves back and forth is dramatically shorter than the subjective time span along which humans mentally travel. To the extent other species show evidence of a temporal organization of behavior, the time range they are capable of mastering seems to span only hours and days (Roberts, 2002).

Figure 8.1 provides a rough illustration of past and future mental time travel taking place along a subjective time span that varies in length from humans to other species and between adults and children. “Current self” refers to the site of autonoetic awareness. It is also the source of motivational constraints (i.e., mood states and current concerns) and individual differences (e.g.,

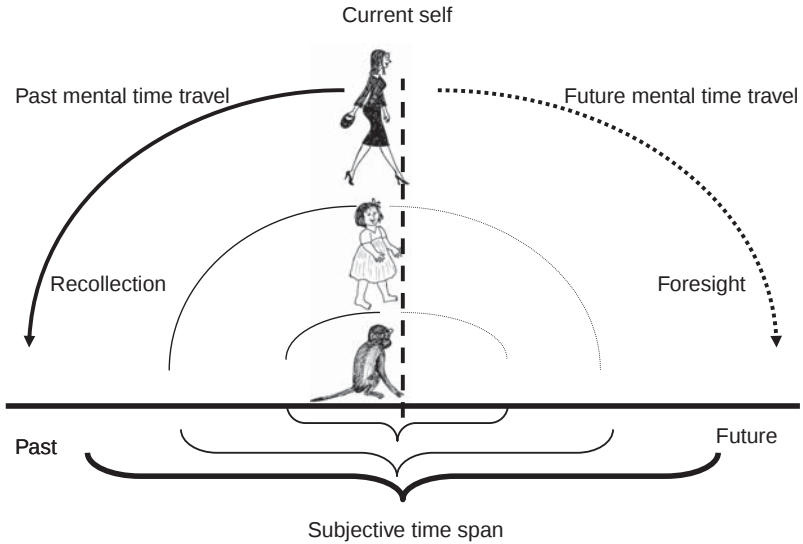


Figure 8.1. Past and future mental time travel taking place along a culturally structured subjective time line varying in length between humans and other species, and between adults and children. Past and future mental time travel has a voluntary and an involuntary mode.

personality). In the case of humans, the subjective time span is structured culturally. For example, during childhood children acquire a canonical cultural life script – referring to a shared cognitive schema for the most important transitional events in life and their expected timing (Berntsen and Rubin, 2004). They also develop the ability to structure their life experiences in terms of a life story (Bohn and Berntsen, 2008; Habermas and Bluck, 2000), and they acquire knowledge of calendars and the clock (e.g., Friedman, 1992). The cultural knowledge structures underlying the subjective time span in humans help to provide content, context, and coherence to both involuntary and voluntary past and future mental time travel. Thus even if we share the ability for involuntary mental time travel with other species, the content and quality of this activity, as well as its application to problem solving, self-understanding, and social bonds, would be dramatically different in their case. We would still not know what it is like to be a scrub jay (Nagel, 1974).

Functions of involuntary mental time travel

At the end of this book it seems reasonable to ask what possible functions involuntary memories and future event representations might serve in humans? If involuntary episodic memory is a primitive forerunner of the voluntary mode, why hasn't the latter replaced the former? In other words, what can the involuntary mode offer us that adds to the functions served by the more sophisticated voluntary mode? A quick answer would be that a key function of involuntary mental time travel is to provide potentially relevant information in situations when it disturbs us the least and is most likely to be relevant. An even shorter way of formulating its main function would be to say that it is there *to prevent us from living in the present*, which we would do to a much larger extent if all mental time travel had to be initiated in a conscious and goal-directed fashion.

As argued previously in this book, in moments in which we are not engaged in attention-demanding tasks, when we are unfocused and relaxed, our mind is very likely to be hijacked by an involuntary memory or an involuntary future event representation, if features that strike our attention in such moments are able to initiate sufficient spreading activation to specify an event. Thus involuntary memories and involuntary future event representations usually come to mind when they are most likely to cause us least disturbance. This does not mean that they never disturb us, only that the mechanisms responsible for their elicitation optimize the likelihood that we have nothing better to think about when they come. Furthermore, the involuntary mode is governed by an interaction between cues in our current situation and accessibility factors such as temporal distance, emotion, and distinctiveness, which together increase the likelihood that whatever comes to mind will be of some relevance. Again this does not mean that all involuntary memories and future representations are relevant and useful, only that the involuntary mode operates in a way that optimizes relevance.

Involuntary episodic memories and future event representations are generated with little cognitive effort and allow us to

rehearse our past and prepare our future in situations in which our present activities do not require full attention. Their main function may simply be to prevent us from living in the present. As mentioned, animal researchers have observed that non-human species to a large extent seem to be stuck in the present (e.g., Roberts, 2002; Suddendorf, 2006). Being able to escape the present is generally thought to be a major evolutionary advantage (see the quotation by George Miller that opens the present chapter). It endows the organisms with flexibility by enabling planning and learning. I therefore propose that involuntary mental time travel constitutes an important mechanism for taking us out of the present. It is especially economical because it typically takes over in non-attention-demanding situations. It thus helps us to maintain a wider time horizon in our lives with low cognitive costs. The involuntary mode of episodic memory does this by providing an automatic mechanism for maintaining and re-evaluating memories of the past and adjusting future goals in the light of a constantly shifting present reality. Because involuntary memories operate in an automatic fashion and, at the same time, are supported by sophisticated cognitive and cultural knowledge structures, they are an important contribution to the flexibility of human behavior.

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